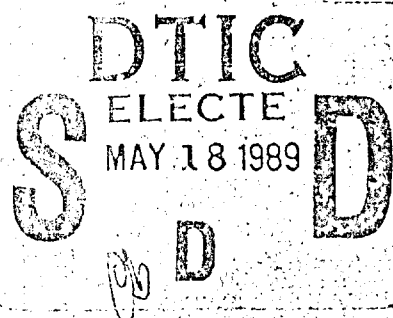


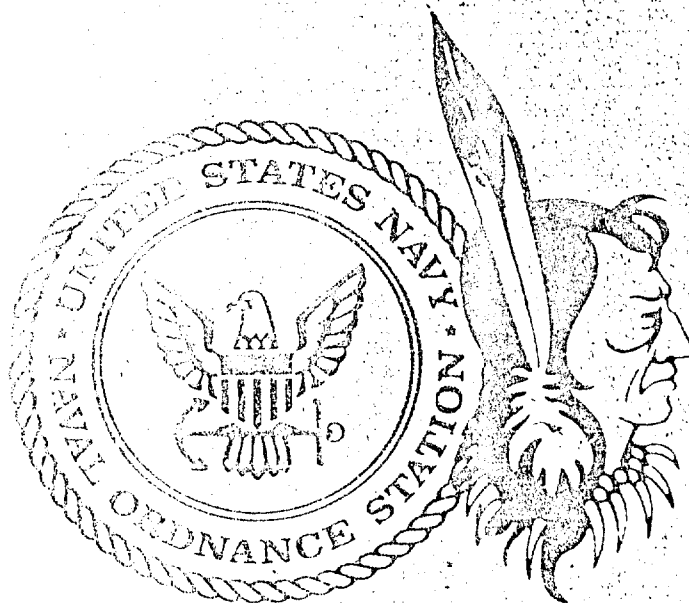
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PERFORMANCE MEASUREMENT IN THE NAVY INDUSTRIAL FUND ORDNANCE COMMUNITY



Dominic J. Monetta
Myron W. Holmes



INDIAN HEAD, MARYLAND

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EXECUTIVE SUMMARY

The Performance Measurement Indicators System (PMIS) being developed by the Naval Sea Systems Command, Ordnance Navy Industrial Fund community (ORD/NIF) is at an important juncture. To date much of the development effort has focused on monitoring reduction goals established by the Naval Industrial Improvement Program (NIIP). Research and private sector experience indicate that emphasis on reduction programs to improve performance is at best a short-term or tactical solution which often is self-defeating. This point is made by many noted scholars of management such as Deming, Drucker, Kami, Skinner, Sink, Walton, Peters and Waterman.

A successful performance measurement system must be linked to the long-term strategy of an organization and not to near-term tactics according to experts such as Sink. Drucker and Deming point out that control or performance measurement systems are significant factors in the culture of an organization. There is increasing evidence that the most appropriate culture in knowledge-based organizations is that of commitment rather than control. The commitment organization approaches performance and productivity improvement by setting high performance standards to increase the effectiveness or output of its resources. Control organizations focus on efficiency or inputs and set minimum acceptable performance standards. Control organizations are accordingly slow to recognize the real, though often intangible, assets such as customer satisfaction, quality consciousness and employee motivation. Commitment organizations are faced with the challenge of measuring and accounting of these intangible assets.

The Centers of Excellence strategy of the ORD/NIF is a major step toward a commitment organization. A second major step would be a performance measurement system aligned with the culture and desired results for the Centers of Excellence. Such a performance measurement system would give the ORD/NIF community a tool to focus on its efficiency, an input side issue, and, more importantly, focus on its effectiveness, an output/outcome side issue. This would help the Centers of Excellence develop the necessary expertise and resources to meet the major growth in fleet support requirements driven by increased numbers of ships and the evolution of more technically sophisticated weapon systems.

This approach conforms closely with the views expressed recently by Senator Sam Nunn in the *New York Times*... "We must not only have the right forces, we must manage those forces effectively and efficiently.... Over the longer term, defense managers must increase military capabilities without large increases in defense spending. This will require stable, predictable levels of defense spending and improving the quality and authority of senior civilian acquisition managers in the Pentagon." Further development and refinement of the Operational and Global Indicators System is essential for the ORD/NIF community to have true Centers of Excellence.

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INTRODUCTION

This technical report appraises the Naval Sea Systems Command, Ordnance Navy Industrial Fund (ORD/NIF) performance measurement system development effort led by the Naval Ordnance Station, Indian Head, MD (NAVORDSTA). Performance measurement has been discussed and addressed by almost every organization in the Department of Defense. In the ORD/NIF community, each of the eleven sites have to a degree developed their own performance or productivity measurement system during the past several years. As part of the Naval Industrial Improvement Program (NIIP), a formal effort to build a Performance Measurement Indicators System (PMIS) was undertaken by the Naval Sea Systems Command (NAVSEASYS COM); Combat System Field Operations and Ordnance Support Group (SEA-06G). NAVORDSTA was assigned to lead the PMIS development effort under the coordination of Dr. Dominic J. Monetta, Technical Director of NAVORDSTA.

This report has a twofold purpose:

- Document the PMIS development effort.
- Suggest areas where the effort could be improved.

References to management theory and private sector experiences based on research conducted by Indian Head highlight and support the concepts presented in the report.

(Kf c-)

OVERVIEW

This report discusses several thought-provoking points regarding the NIIP strategy to improve productivity and recommends an approach to further develop ORD/NIF's performance measurement system. Here is a summary of the points discussed:

- The cost reduction approach to productivity improvement is at best a short-term solution.
- Short-term solutions are detrimental to productivity and self-defeating unless tied clearly to strategic objectives.
- Public sector performance improvement efforts are frustrated by a limited understanding of output and partially defined and unmeasured objectives.
- Effective performance measurement systems and productivity improvement programs are driven by an organization's mission, culture and objectives.
- Successful private sector companies in knowledge-based industries are adopting a commitment organization focused on long-term effectiveness, value-added involvement and ownership, and a customer orientation.

These points have significant bearing on the NIIP objectives and the strategic thrust of the ORD/NIF community, both of which need to be reflected in the Performance Measurement Indicators System. The recommended approach is to further develop the performance measures, especially at the global level, to build on the "Centers of Excellence" by linking performance with the objectives and desired results of these organizations. This approach will move the ORD/NIF community closer to the commitment organizations that have achieved substantial fundamental productivity improvement similar to that needed to support the fleet and respond to budget pressures.

BACKGROUND

The initiative to develop a formal system for performance measurement was fundamentally driven by the NIIP. An important point to bear in mind is that the NIIP itself was largely a *response* to developments or trends in *upgrading* the *effectiveness* of the fleet. The most significant developments were (1) the major expansion of the fleet, and (2) modernization of the fleet with sophisticated high-performance weapons, surveillance, and operating systems.

These two developments within the Navy to enhance effectiveness, challenged the ORD/NIF community to fulfill its mission to maintain fleet readiness without increasing its resources commensurate with the growth in demand created by the enhanced and expanded fleet. The NIIP became the prime strategy to meet the challenge. The NIIP initiative to develop a formal measurement system to monitor and guide performance or productivity improvements is a critical component of the overall program.

PERFORMANCE MEASUREMENT ACTION TEAM REVIEW

One of the key action items of the Naval Industrial Improvement Program is to establish a formal system of performance measurement within the ORD/NIF community. In June of 1987 a Performance Measurement Action Team (PMAT) was assembled under the chairmanship of Mr. Myron Holmes, Director of the Management Analysis Division of NAVORDSTA, to develop such a system. The team was composed of representatives from field activities, headquarters and an outside contractor as follows:

M. Holmes (Chair)	Naval Ordnance Station, Indian Head, MD
J. O'Brien	Naval Ordnance Station, Indian Head, MD
T. Myers	Naval Ships Weapons Systems Engineering Station, Pt. Hueneme, CA
T. Weaver	Naval Weapons Support Center, Crane, IN
E. Hoar	Naval Weapons Station, Yorktown, VA
L. Farner	Naval Undersea Warfare Engineering Station, Keyport, WA
M. Paten	Naval Ordnance Station, Louisville, KY
S. Askew	Naval Sea Combat Systems Engineering Station, Norfolk, VA
L. Tow	Naval Sea Systems Command, Washington, DC
J. Johnson	Naval Sea Systems Command, Washington, DC
B. Hoffman	Coopers & Lybrand, Arlington, VA.

The PMAT established the following objectives for a performance measurement system at its first meeting in early July, 1987:

- Articulate performance up the line.
- Support achievement of the ORD/NIF \$300 million saving goal.
- Stimulate performance improvement throughout ORD/NIF businesses.
- Provide a consistent concept for performance measurement throughout the ORD/NIF community.

At the inaugural meeting, the PMAT agreed that performance indicators should be customer-oriented and reflect corporate values from the top. Indicators should ideally be available at the level where the work is performed and be consolidated up through a hierarchical structure to provide management at each level with information to assess performance trends. Indicators at the operational or working level make it easier to identify and implement improvements to each organization's processes for planning, production and services.

Performance indicators should focus on improvement rather than standards of acceptability. To focus on improvement performance, indicators need to emphasize time series data to allow period-to-period comparisons. The team felt that comparisons of organizations to one another carried serious risks, given their differences in mission and work load. They concluded that such comparisons could divert energy away from process improvement to nonproductive efforts to research and explain to management legitimate differences in mission, work load, and environment. ORD/NIF organizations are more easily measured against their own past performance rather than the performance of others.

Utilizing the Nominal Group Technique (Delbecq, 1986), the PMAT defined five categories for measuring performance at the operational level: workload, productivity, quality, service, and cost (output/cost). These categories were key to developing performance indicators and were part of the basis for reviewing existing measures inside and outside the ORD/NIF community.

The team recognized that developing a complete hierarchical system of performance indicators throughout the ORD/NIF community would be a long-term effort and felt that practical global indicators needed to be developed for headquarters to be better informed about ORD/NIF performance. This two-level, global and operational approach to performance measurement would satisfy the needs of headquarters and the stations with the long-term goal to merge or roll up the measures from both levels in the future.

The PMAT reviewed performance measurement efforts inside and outside of the ORD/NIF community to identify sites with similar concepts. They surveyed each of the ORD/NIF stations to identify performance measures currently being used. The survey of the stations showed that performance measurement was being done at each site, and that the commanding officers and senior civilians tended to be the prime users; i.e. the measures were generally global indicators of the station's performance. Functional or operational measures were being used when there was a clearly definable output; e.g., manufacturing activities. While performance measures existed, a systematic process to review the measures to address problems and improve processes was not well defined.

With respect to performance measurement outside the ORD/NIF community, the PMAT selected the Public Works Center in Norfolk, VA to review in greater detail because it had recently implemented a performance measurement system that conformed to the team's concept for operational performance measurement. A subgroup visited the Public Works Center and reported the following findings, particularly with respect to implementing an operational-level performance measurement system:

- (1) Major cultural and business behavior changes were involved.
- (2) Resistance was met from management and staff in implementing.
- (3) "Top-down" direction was essential.
- (4) A fully empowered outside agent was critical to drive home and prevent diversions.
- (5) Program implementation included:
 - Exemption from personnel regulations in order to have the flexibility to move or transfer people during startup.
 - Mechanisms for experimentation or trials to test and document productivity and efficiency steps.
- (6) Systematic review using performance measures is important to achieve process improvement.

The subgroup also identified the following key features as critical to a performance measurement system:

- Focus on customer satisfaction
- Focus on mission accomplishment
- Focus on performance improvement
- Focus on overall performance; quality, effectiveness, cost efficiency
- Measurement plus the process to control and improve
- Clear accountability.

With this background the PMAT decided to approach the station-level indicators as operational indicators which would supplement existing performance indicators used at the stations. Using a criteria-based decision process, the PMAT selected pilot sites representing the major businesses of ORD/NIF in order to facilitate development.

The measures developed and tested with the assistance of an outside implementor at these sites would then be "rolled out" to sites with similar operations. Having developed a plan for the field-level indicators, the PMAT then concentrated on the headquarters-level indicators, as globals. The initial criteria used to develop these measures were:

- Existing headquarter (HQ) objectives
- Perceived HQ concerns; i.e. "what do they want"
- Field activities' views as to what HQ needed or should be told
- Survey results.

The global indicators were viewed as a tool to help the NAVSEA Combat Systems Field Operations and Ordnance Support Group (SEA-O6G) to (1) better manage field activities, (2) highlight status on major issues, (3) promote field activities, and (4) provide accountability. The PMAT, again using the Nominal Group Technique, considered approximately 80 indicators which were consolidated and prioritized to 25. These remaining indicators were further refined and augmented several times by sending them as strawmen to the stations and by reviewing them with SEA-O6G.

On 15 September 1987 Dr. Dominic J. Monetta, as a member of the ORD/NIF Productivity Steering Council, briefed the ORD/NIF Board of Directors on the PMAT approach and concepts for overall performance measurement. The Board gave their full support to the approach and included safety and security as additional areas for global indicator development.

In mid-November 1987, the PMAT proposed to implement the global indicators for which the field stations said data was readily available. To assure feasibility of the indicators, all the global indicators were first to be tested using NAVORDSTA as the Beta site. The results of the test were presented to SEA-O6G in February 1988, and some improvements were made based on feedback from headquarters. Appendix A provides formats with sample data for these ORD/NIF performance indicators. Subsequently, the global indicators were turned over to an implementor contractor tasked to incorporate global indicators into an overall performance measurement program for the ORD/NIF community.

PRIVATE SECTOR PARALLEL

In many respects the challenge confronting the ORD/NIF is similar to that confronting the private sector in the United States. In both cases the ultimate requirement is for higher performance to satisfy the demands of customers, shareholders, and employees. The influx of foreign goods and services has been driven by customers' perceptions of quality and price advantage. Recent and current business restructuring, evidenced by mergers, leveraged buy-outs, and acquisitions, often reflects a recognition that a particular business is not performing or realizing its potential in the eyes of investors, managers, directors or shareholders. Fundamental to these competitiveness or performance issues faced by the private sector is a firm's ability to develop and implement a strategy to maximize the effectiveness of resources to provide high-quality goods and services at a competitive price. In a word, the successful firms today are focusing on value (Walton, 1986).

This concept of value is evident in how customers, employees, suppliers and shareholders are viewed and how products and services are made and delivered. The concept of value has both strategic and operational implications; the concept of value is becoming the desired culture for fostering success. Adopting the concept frequently is difficult, however, because it often conflicts with traditional management practices (Hackman, 1985). The differences in the approaches are implicit in their descriptions. The traditional approach is termed a "control" model in which work is broken into small or specialized components and "performance expectations expressed as standards that define minimum acceptable performance" (Walton, 1985a). Within the management structure "inevitably layering develops and is justified by control considerations as '...labor is...managed as a variable cost'" (Walton, 1985a). The control model aligns with Frederick W. Taylor's philosophy from the early part of the twentieth century.

The newer model developed during the past fifteen years emphasizes commitment. This model effectively accommodates rapid change and knowledge-based activities which require team participation. "Performance expectations are set relatively high; they are 'stretch objectives', rather than minimum performance" (Walton, 1985b). The emphasis is on upgrading and "continuous improvement ...oriented to the marketplace... rather than measurement of the work itself" as in the control model.

This change in thrust to a commitment- or value-driven organization has created an accounting lag in measuring the key assets or attributes of such an organization. Many of these assets are intangibles, such as customer satisfaction, quality, and worker motivation, that are not captured or recognized by today's accounting methods even though the benefits are real and growing in significance at a rapid rate (Kaplan, 1985). W. Edwards Deming alludes to this problem in discussing the decline of U.S. industry: "By 1969, the comptroller and legal department began to take charge for survival, fighting a defensive war, backs to the wall. The comptroller does his best, using only visible figures, trying to hold the company in the black, unaware of the importance of figures that are unknown or unknowable.... Unfortunately management by the comptroller and the legal department brings only further decline. Consequently, the traditional and most basic of performance measures, the bottom line, is under scrutiny as a truly accurate reflection of an organization's performance and guide to future investments" (Deming, 1985).

Performance Measurement—Strategic Implications:

Most management philosophies share the importance of measuring performance. A performance measurement system has three key functions: (1) monitor or control operations; (2) assess progress or improvements; and (3) highlight the plans and expectations of an organization to customers, employees, shareholders, vendors, etc. (Sink, 1985; Brady, 1984). Management theorists and practitioners also agree that an organization's performance measurement systems should be tied directly to the organization's strategic goals and objectives. As stated by W. Edwards Deming, every organization must "create a constancy of purpose toward improvement of product and service, with the aim to become competitive, stay in business, and provide jobs" (Deming, 1985). This phrase contains both strategic and performance connotations. "Constancy of purpose", "product and service", "aim", "competition," and "jobs" are strategic references. "Create", "improvement", and "provide" are references to performance. Peter Drucker emphasizes the fundamental impact of the control aspects of an organization's performance measurement system on its strategy in the following quote from his highly acclaimed book *Management: Tasks, Responsibilities, Practices*:

Yet here is the real control of the institution, that is, the ground of behavior and the cause of action. People act as they are being rewarded or punished. For this, to them, rightly is the true expression of the values of the institution and of its true, as against its professed, purpose and role (Drucker, 1974).

What Performance to Measure:

Within this context of (1) linking an organization's strategy to its performance measurement system and (2) the features of a control- versus a value- or commitment-oriented organization, understanding and defining what is to be measured becomes critical. A generic guide to areas which could be measured prepared by Dr. Scott Sink, Director of the VPC, a center studying the management of quality and productivity at Virginia Polytechnic Institute and State University, is presented in Figure 1 (Sink, 1985). Of particular interest are the parallels between the different terminologies used by Drucker, Sink, and Peters and Waterman (authors of *In Search of Excellence*).

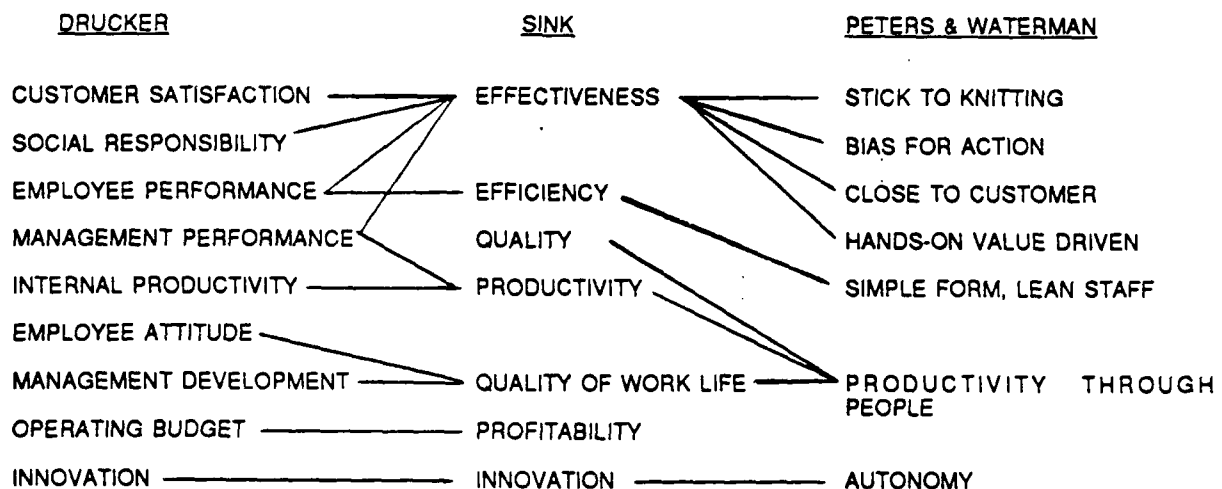


FIGURE 1. ORGANIZATIONAL SYSTEMS PERFORMANCE CRITERIA

Selection of the generic criteria to measure is guided by the *results* desired by the organization. Implicit in the selection and use of performance measures is the culture of the organization for achieving the desired results. The key determinants in selecting what to measure boil down to two factors: (1) the constancy of purpose, i.e. what does the organization want to accomplish; and (2) how it wants to cause the action to accomplish its purpose. The measures selected send a clear signal to an organization's clients/customers, employees, suppliers, etc. The communication aspects of the measures are important; Sink quotes from Barnard (1939) to emphasize the point: "Essential to the survival of an organization is the willingness to cooperate, the ability to communicate, and the existence and acceptance of purpose" (Sink, 1985).

PERFORMANCE MEASUREMENT AND THE PUBLIC SECTOR

Although Drucker, Deming, et al., address all organizations in concept, the nature of the public sector requires further understanding to appreciate the sensitivities and difficulties of performance measurement. Defining and measuring output, effectiveness, productivity, and quality and innovation in terms of results, not activities, for service organizations is a struggle. For a nonprofit governmental entity defining and measuring these criteria are especially difficult (Swiss, 1983). Drucker highlights the tendency of public sector organizations "to set lofty though imprecise and non-quantifiable objectives as one of the Seven Deadly Sins of Public Administrators" (quoted in Ammons, 1985). To have a chance at performance, a program needs clear targets, the attainment of which can be measured, appraised, or at least judged (Ammons, 1985).

Recognizing the uniqueness of the public sector and the associated constraints is the first step in avoiding the frustration which plagues performance improvement efforts (McGowan, 1984). Despite the difficulties in measuring and the organizational differences, research demonstrates similarity between the public and private sectors in defining what is technically important in selecting performance measures (Bain, 1982; Grizzle, 1985). The key technical criteria are as follows:

- (1) Validity—does it accurately reflect what is to be measured?
- (2) Completeness—does it take into account all components of the area to be measured?
- (3) Comparability—does it allow accurate measuring between periods or organizations?
- (4) Inclusive—does it tie to or integrate with other areas measured in the organization?
- (5) Timeliness—does the measure reflect changes soon enough for taking action?
- (6) Cost effectiveness—does the measurement effort exceed the usefulness of the measure?

Where Does ORD/NIF Fit:

Several issues have been addressed regarding the development of the ORD/NIF's Performance Measurement Indicators System:

- The background which prompted the need; i.e., the enhanced effectiveness of the fleet and the ORD/NIF's challenge
- A review of the PMAT objectives and concepts used to develop a performance measurement system for the ORD/NIF community
- The similarity of the challenge to the private sector's competitiveness challenge and how the private sector has responded by focusing its strategy on being more effective and creating a culture of value
- The characteristics of the traditional control and the relatively new commitment organization and the lag in accounting methods

- The role of performance measurement in modern management and why it is critical to link a performance measurement system to an organization's desired results and desired culture
- An overview of the generic categories of performance measurement
- A brief review of the obstacles in measuring performance in public sector and what technically to consider when developing performance measures in either the public or private sector.

The PMAT was successful in laying the conceptual groundwork for PMIS and successful in getting the ORD/NIF community thinking about performance measurement. How do the PMAT performance measurement concepts stand up to modern management theories? What are the weaknesses? How can they be improved?

Conceptually, PMAT broke the PMIS into two sets of indicators, global and operational. This approach was designed to provide sufficient flexibility to the stations to tailor the operational indicators to their particular needs. The global indicators should provide uniform key performance information about each station so that SEA-06G can monitor, direct and refine policy and strategies. This approach is generally recommended by experts in the field of performance and productivity measurement such as Sink, Bain, Thorn and Kendrick (Sink 1985; Bain, 1982; Thorn, 1983; Kendrick, 1984).

Kami's research highlights the need for three types of controls or performance measures. The first are *operational controls* to ensure that what is being done is being done well. The second, a higher level, are *overall controls* designed to ensure that what is being done is appropriate to a firm's well-being or strategy. Kami cites several examples of firms which had sophisticated operational controls for micromanagement but ultimately got "out of control... because major issues, organizational entities, projects and business sectors were not accounted for." These firms lacked overall controls. The third control that Kami emphasizes is a *qualitative control standard*. This control is in contrast to the quantitative, especially budget and financial, nature of the operational and overall controls. Qualitative controls "get behind the figures and measure the quality of the information you are getting." In many respects qualitative control is based on mechanisms for reviewing performance and the "cross-flow of information below... and with the top management level" (Kami and Ross, 1973).

The role of the PMAT in getting the ORD/NIF community to focus on performance measurement was important in defining the initial global indicators. Ideally, according to Sink and others, a particular level of management should use seven, plus or minus two, indicators. The list of global indicators below should be viewed primarily as a starting point for refining.

Global Performance Indicator Subject Areas

Indirect staffing
Indirect nonlabor cost
Inventory investment
Direct labor productivity
Engineering services saving
Total NIIP savings
Manage to payroll
Safety
Security
Activity workload by COE/sponsor
Workload composite by COE
Constrained vs. unconstrained workyears
Carryover and carryover projection

Performance Measures

Efficiency
Efficiency
Efficiency
Efficiency
Efficiency
Efficiency
Budgetability
Quality of work life
Quality of work life
Effectiveness
Effectiveness
Effectiveness
Effectiveness

Net operating results
ACP obligation rate
Direct labor hours
Facilities

Budgetability
Effectiveness
Budgetability
Effectiveness

To more closely analyze these performance measures, a review of the criteria or categories listed earlier is helpful. The seven noted by Sink are listed and described (Sink, 1985).

(1) Effectiveness—degree to which desired results are accomplished on time, without error (quality), in the amount/magnitude desired

(2) Efficiency—degree to which resources are utilized, especially the right resources in the right way, versus a plan or standard

(3) Quality—degree of conformance to customer requirements; fitness for use; absence of errors or problems in the product or service measured at five checkpoints in the system to ensure total quality is assessed

(4) Productivity—relationship of outputs to inputs [Note: This measure can also be viewed as the relationship of effectiveness to efficiency (Bain, 1982).]

(5) Quality of worklife—effective response of employees to the overall work environment; e.g., secure, safe, bored, satisfied, motivated, and so forth

(6) Innovation—degree to which there is creative improvement, technology can be developed and assimilated, and responsiveness to change

(7) Profitability/budgetability—relationships between financial resources and their use; budget performance.

Adapting these seven criteria for application in the ORD/NIF community was not an easy process despite their apparent straightforward nature. As noted, the nonprofit and service nature of many government entities makes criteria tied to output—namely effectiveness, productivity, and quality—hard to define and measure in terms of actual results. The global indicators when analyzed within the context of the NIIP, i.e., the strategic plan for meeting the challenge to support an expanded fleet, appear to emphasize measurements of efficiency and budgetability.

Recognizing DOD's overall budget pressure, the emphasis on input measures, especially budgetability, is understandable. Strategically however, these measures which focus on inputs are flawed because they do not follow the emphasis in the fleet on enhanced effectiveness or increased output. This flaw should be resolved or it will present an important strategic dilemma to the ORD/NIF community in the long term. The down-sizing implicit in emphasizing efficiency and budgetability as an organization's primary performance measures reflects a basic change in the strategy, if not the mission, of an organization (Cody, Hegeman, and Shanks, 1987; Applebaum, Simpson, and Shapiro, 1987). When the demand for an organization's output is increasing, the strategic seriousness of such a course of action is heightened.

What the challenge confronting the ORD/NIF community requires is improved productivity; i.e., get more output for each unit of input. Within this context emphasis on input-oriented measures is questionable. The result required is improved *productivity* which means that output must receive at least an equal amount of emphasis for the performance measures selected to meet the validity and completeness requirements. These are the two most important technical criteria (Bain, 1982; Grizzle, 1985). Without an emphasis on output, the measures do not accurately

reflect what is to be measured, i.e., productivity, from the validity perspective. Similarly, without consideration of output, the measures do not take into account all components to be measured and therefore do not meet the completeness requirements.

Focus on input is a common approach to company productivity improvement programs, but it carries substantial long-term risks to corporate health. Results from a survey conducted by Shetty in 1983 and 1984, which included responses from 171 major U.S. industrial and nonindustrial firms, indicated that cost reduction programs were the most widely used strategies for improving productivity. Below, in order of decreased use, is a summary of the results obtained by Shetty (Shetty, 1986):

- Cost reduction
- Employee participation
- Productivity incentives
- Goal setting with productivity focus
- Increase automation
- Quality improvement
- Increase employee training
- Better labor-management relations
- Increase research and development.

According to Shetty, fast results and the relative ease of developing and implementing were the principal reasons that cost reduction programs were chosen (Shetty, 1986). Also cited was the economic environment of the firm; i.e., cost reduction programs are popular when sales are declining, financial strains are prevalent, or the firm's performance is poor in general. Several respondents to the survey noted, however, that cost reduction programs should be viewed only as a short-term effort to weather a storm. Otherwise respondents commented that the firm could well impair its long-term health and wherewithal to sustain productivity growth. "Continuous cost cutting may fall on critical activities such as R & D, market development, quality control, maintenance and repair, and management training, whose negative impact may be severe in the long run" (Shetty, 1986).

Deming is critical of short-term thinking. He views the hope for quick results as self-defeating because the "effect in the long run erodes investment and ends up as just the opposite to what is intended" (Deming, 1985). Skinner shares the views found in Shetty's research and advocated by Deming. Skinner's studies, primarily of manufacturing firms, have highlighted that a "focus on cost reduction programs is proving harmful." He has found in such circumstances that the managers "preoccupied as they are with this week's cost performance, 'resist innovation' as they know well that changes in processes or systems will wreak havoc with the results on which they are measured." Skinner terms the situation as "The Productivity Paradox" because when the focus is solely on cost reduction or minimizing inputs, the results tend to be only a "chipping away at productivity" (Skinner, 1986).

Kami views situations in which cost cutting actions are the primary response to productivity pressures as "evidence of the failure or lack of planning. At worst it is indicative of 'panic management', an affliction that affects many corporations, particularly those that fail to establish good programs of planning and control.... This approach can do irreparable damage to personal relationships, established systems, and employee attitudes" (Kami and Ross, 1973).

Productivity paradox and crisis management are not complimentary descriptions of strategies which place primary focus on cost reduction programs to resolve fundamental productivity issues of an organization. To Skinner, Deming, and Kami, the best, if not the only, way to approach productivity is within the context of an organization's overall goals and objectives. Constancy of purpose, which nurtures planning, innovation, and unleashes the organization, is the first requirement in effecting significant productivity improvement (Walton, 1986; Deming, 1985;

Skinner, 1986). The need for a performance measurement system to control, monitor and guide the progress is critical as (1) it becomes the primary means for communicating what the organization desires to be and accomplish and (2) it causes the action as it provides the grounds of behavior against which people in the organization are rewarded or punished.

ORD/NIF—Centers of Excellence and Performance Measurement:

The ORD/NIF community made an important strategic step when it adopted the Centers of Excellence concept and reorganized accordingly. One of the major benefits of this step was to reduce the redundancy caused by overlapping skills and competition for resources and markets within the community. Enhanced focus and commitment are equally important benefits of the Center of Excellence strategy as they foster true understanding of a site's business and objectives. The Center of Excellence strategy is consistent with the commitment model of organization preferable for knowledge-based activities or businesses like the ORD/NIF community.

The commitment model organization is oriented toward productivity gains via enhanced effectiveness or output from its resources. Performance objectives are set consistent with a long-term goal and corresponding culture of greater value for customers, employees, contractors and shareholders and so forth. The ORD/NIF community has taken steps to strategically position and structure itself around Centers of Excellence to respond to the fleet's trend toward greater effectiveness. The development of a performance measurement system to cause the action, i.e., to guide, monitor and control the community, is an important next step. The commitment model suggests building a critical mass and supporting that organization via investing in it so that continuous productivity gains can be achieved by realizing more effectiveness from available resources; i.e., more output per unit of input. Further development of the ORD/NIF's performance measurement indicators needs to be done in the context of the long-term Centers of Excellence strategy to promote continuous improvement at both the global and operational levels. If approached in this manner, research and experience show that the measures developed (1) are more likely to be technically sound as desired results or outputs will be better defined and tied to inputs, and (2) the productivity improvements will be longer lasting as the cause for action and grounds for behavior will be aligned with the long-term strategy and mission of the ORD/NIF community.

CONCLUSION

The ORD/NIF community could benefit greatly from a formal system to measure performance. The efforts of the PMAT have increased recognition of the potential benefits. The important question now is how the community wants to use a performance measurement system.

A system that emphasizes input or efficiency parameters and neglects strong ties to a strategic plan is at best a quick-fix approach. This approach fails to sustain improved performance and often has negative long-term consequences.

Research and current trends in management practices would favor a system that focuses on commitment to and continuous improvement in the effectiveness of or output from resources to enhance performance and productivity. The ORD/NIF community has a Centers of Excellence strategy upon which it can build a commitment organization. A formal performance measurement system aligned closely with the Centers of Excellence strategy would be mutually reinforcing. Performance measures need to be tied to more clearly defined outputs and outcomes at both the operational and global levels. The performance measurement system could provide the centers and SEA-06G with a powerful tool to monitor, control, communicate, and create the desired culture and actions to achieve results and meet the challenge confronting the community.

The next step in the PMIS development effort is to link the strategies and objectives of the ORD/NIF with performance indicators. This step will require a thorough assessment of the ORD/NIF customers' output needs, such as enhanced product value, military utility, and productivity, and how the ORD/NIF community will measure progress and fulfill those needs in the near and long term. This assessment should be done from both the SEA-06G and Centers of Excellence perspectives. Meshing customers assessments with the ORD/NIF's strategy and higher level objectives will lead to definition of outputs and effectiveness in specific business areas. Only then can consistent and meaningful performance indicators tied to output and effectiveness be developed to systematically guide, monitor, and control all levels of the ORD/NIF. This approach links performance measures to output and customer needs and establishes the capability throughout the organization to measure conformance and achieve continuous improvement. With performance measurement linked to strategy, output and effectiveness, the ORD/NIF will be ready to transition from a control to a commitment organization which it must be to successfully support an expanded fleet and more sophisticated weapon systems in the environment described by Senator Nunn (Nunn, 1988).

Appendix A

SAMPLE ORD/NIF PERFORMANCE INDICATOR DATA

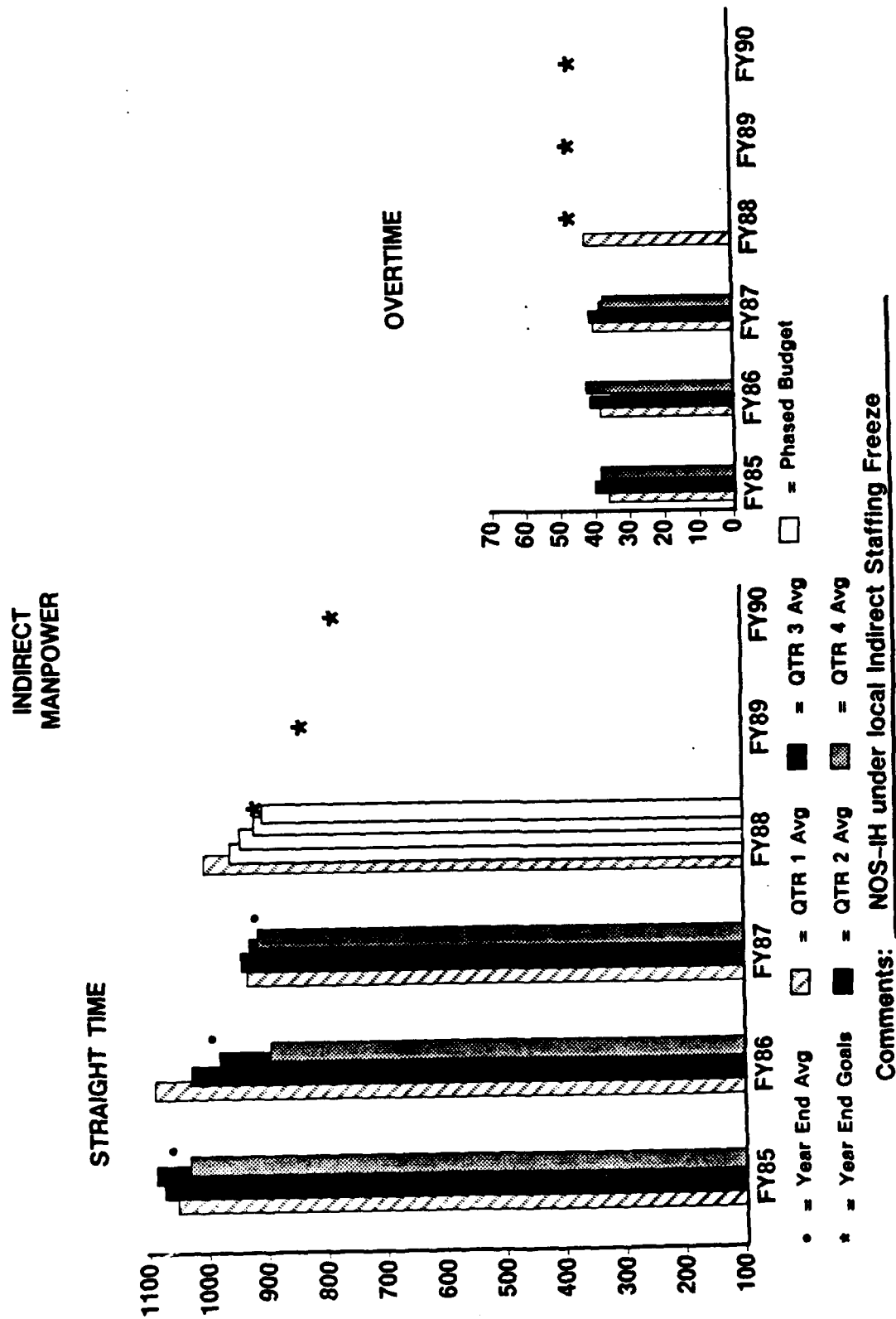


FIGURE A-1. INDIRECT STAFFING (NIIP GOAL)

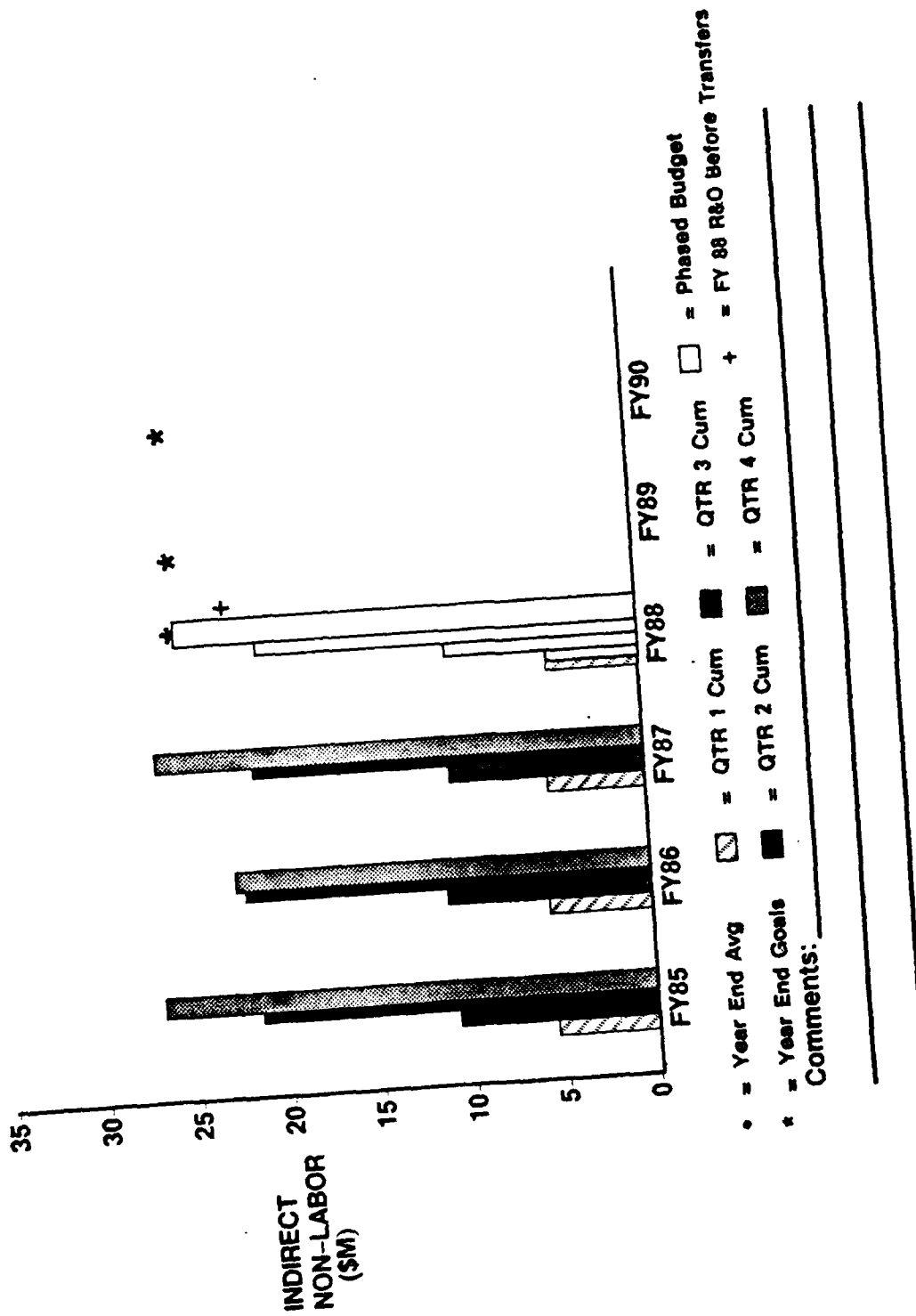


FIGURE A-2. INDIRECT NONLABOR COSTS (NIIP GOAL)

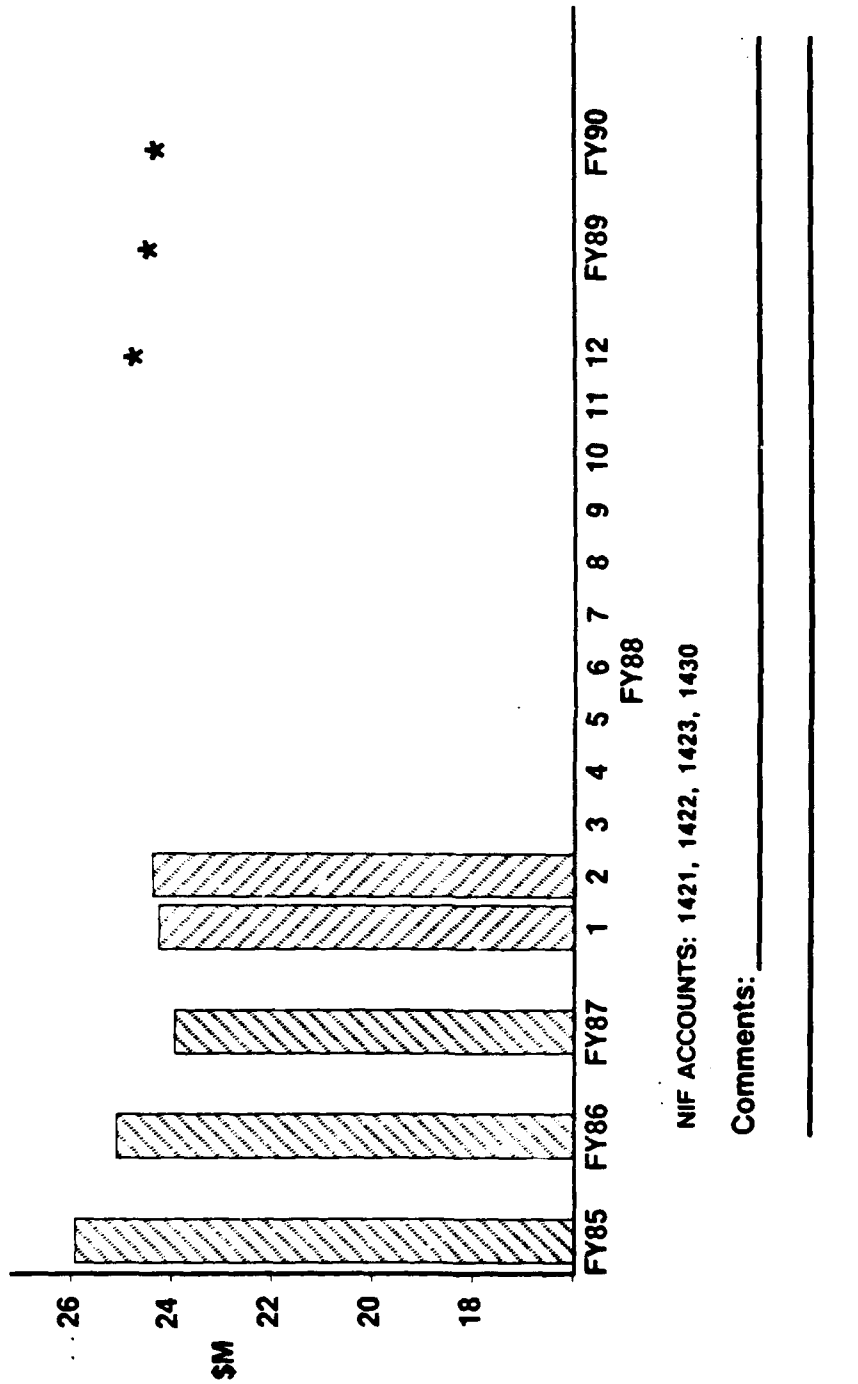
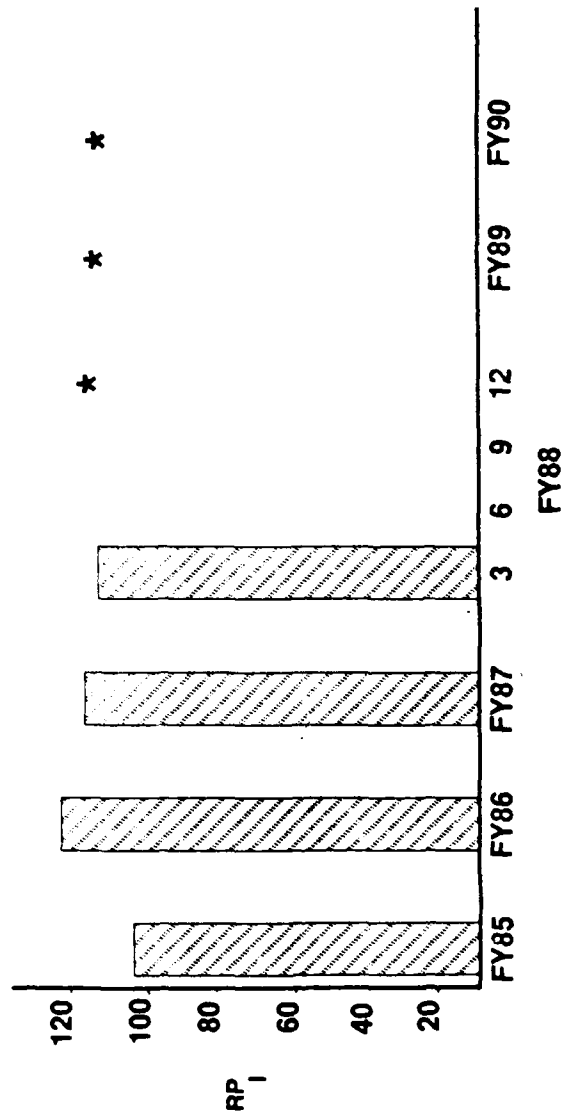


FIGURE A-3. INVENTORY INVESTMENT (NIP GOAL)

RSSI PRODUCTIVITY INDEX (RP_I)

$$RP_I = \left\{ \frac{(\text{FY } 85) \text{ HRS / TON}}{(\text{FY } _) \text{ HRS / TON}} \right\} \times 100$$

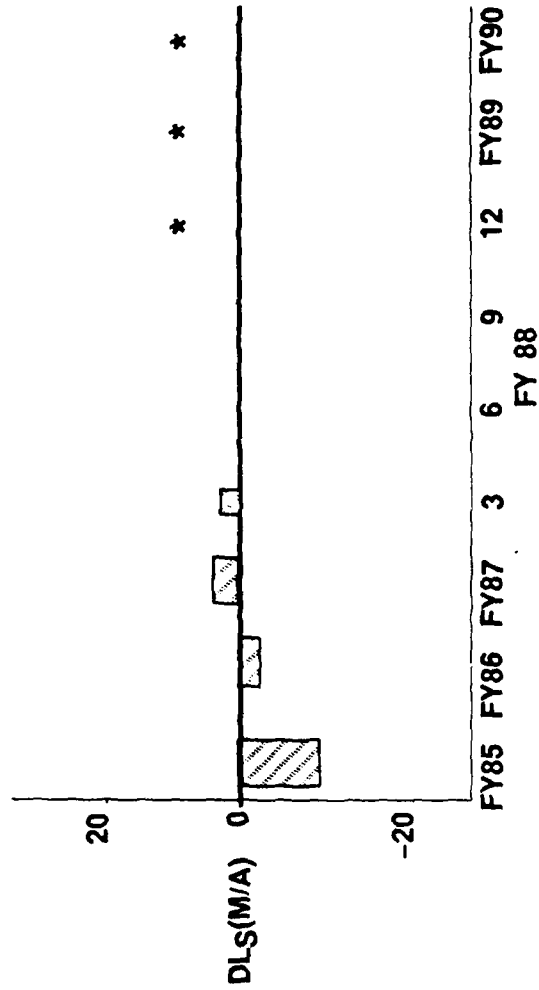


Comments: _____

FIGURE A-4. DIRECT LABOR PRODUCTIVITY (RELATED TO NIIP GOALS)

DLs (MANUFACTURING/ASSEMBLY)

$$DL_S = \left\{ \frac{STD \text{ HRS} - ACT \text{ HRS}}{STD \text{ HRS}} \right\} \times 100$$



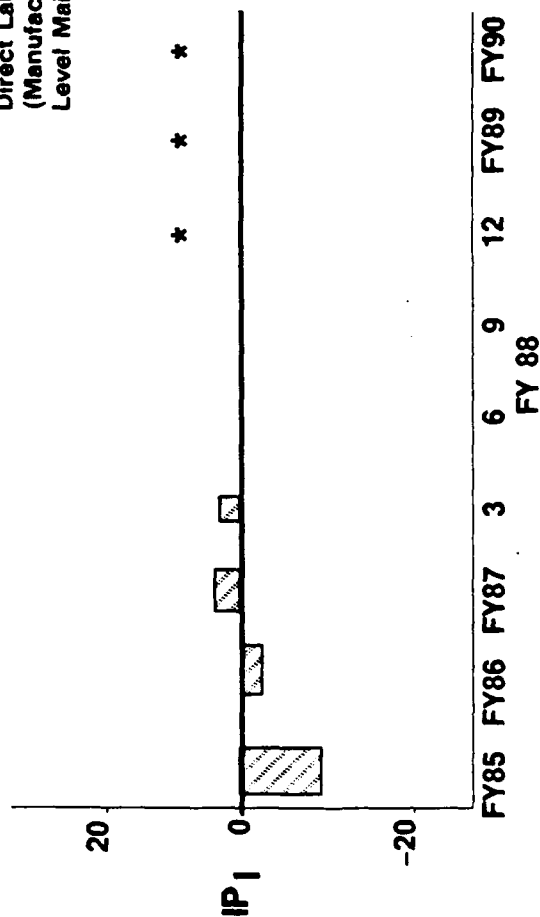
Comments: _____

FIGURE A-5. DIRECT LABOR PRODUCTIVITY (RELATED TO NIP GOALS)

INDUSTRIAL PRODUCTIVITY INDEX (IP_I)

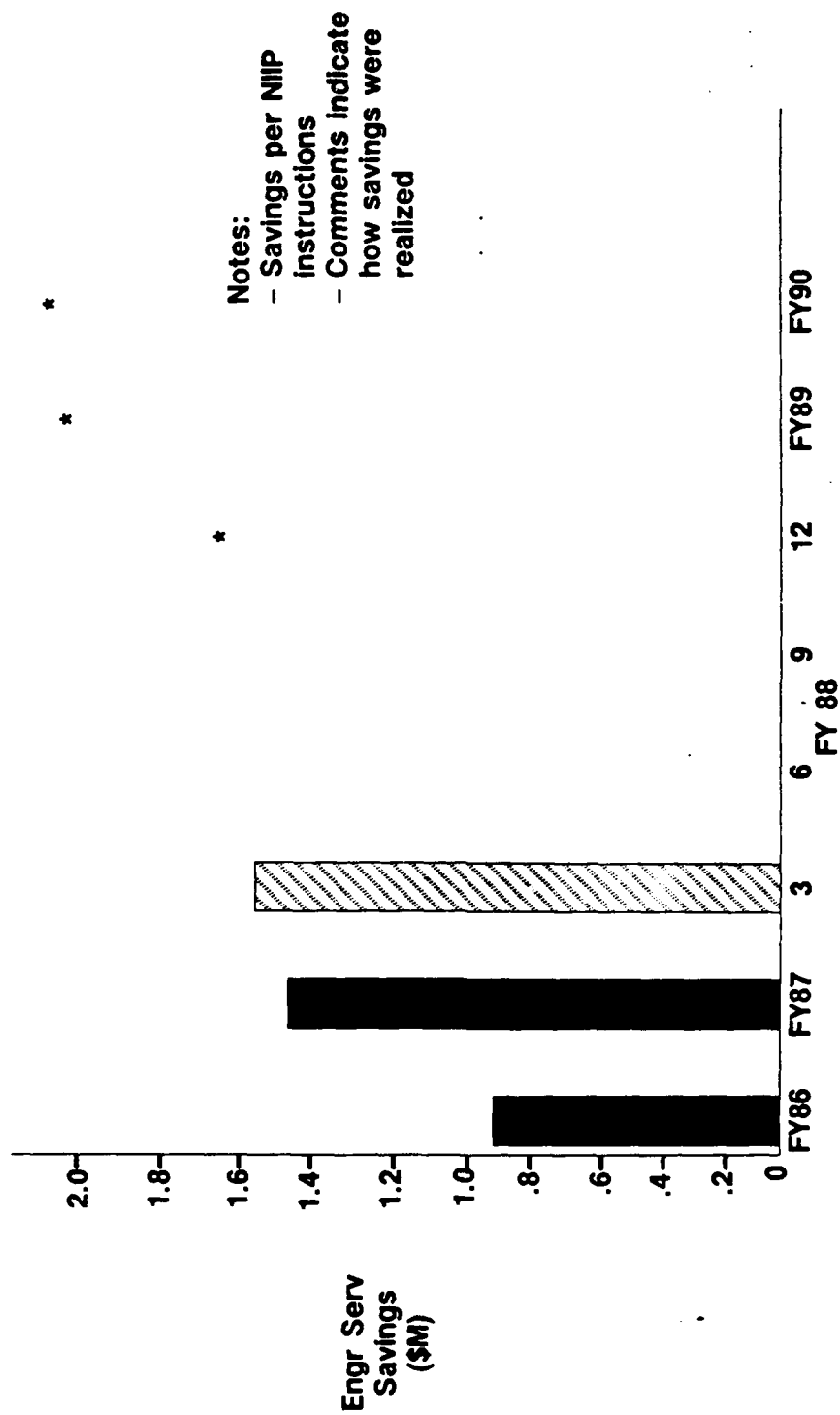
$$IP_I = \left\{ \frac{\sum \text{STANDARD HOURS} - \sum \text{ACTUAL HOURS}}{\sum \text{STANDARD HOURS}} \right\} \times 100$$

- Provides a summation of Direct Labor Productivity (Manufacturing/Assembly, D&I Level Maintenance and RSSI)



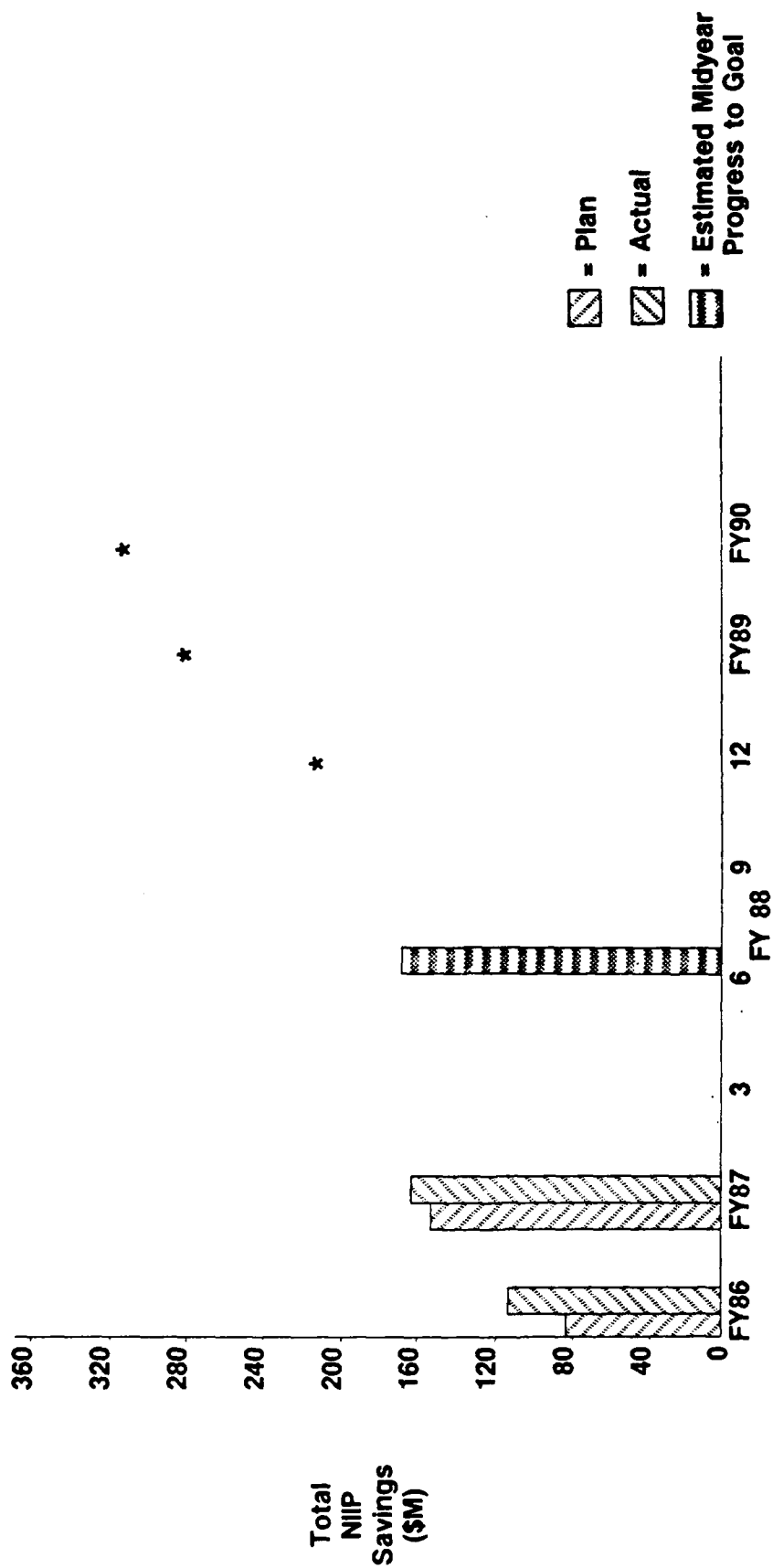
Comments: _____

FIGURE A-6. DIRECT LABOR PRODUCTIVITY (RELATED TO NIP GOALS)



Comments:

FIGURE A-7. ENGINEERING SERVICES SAVINGS (NIIP GOAL)



Comments:

FIGURE A-8. TOTAL NIIP SAVINGS

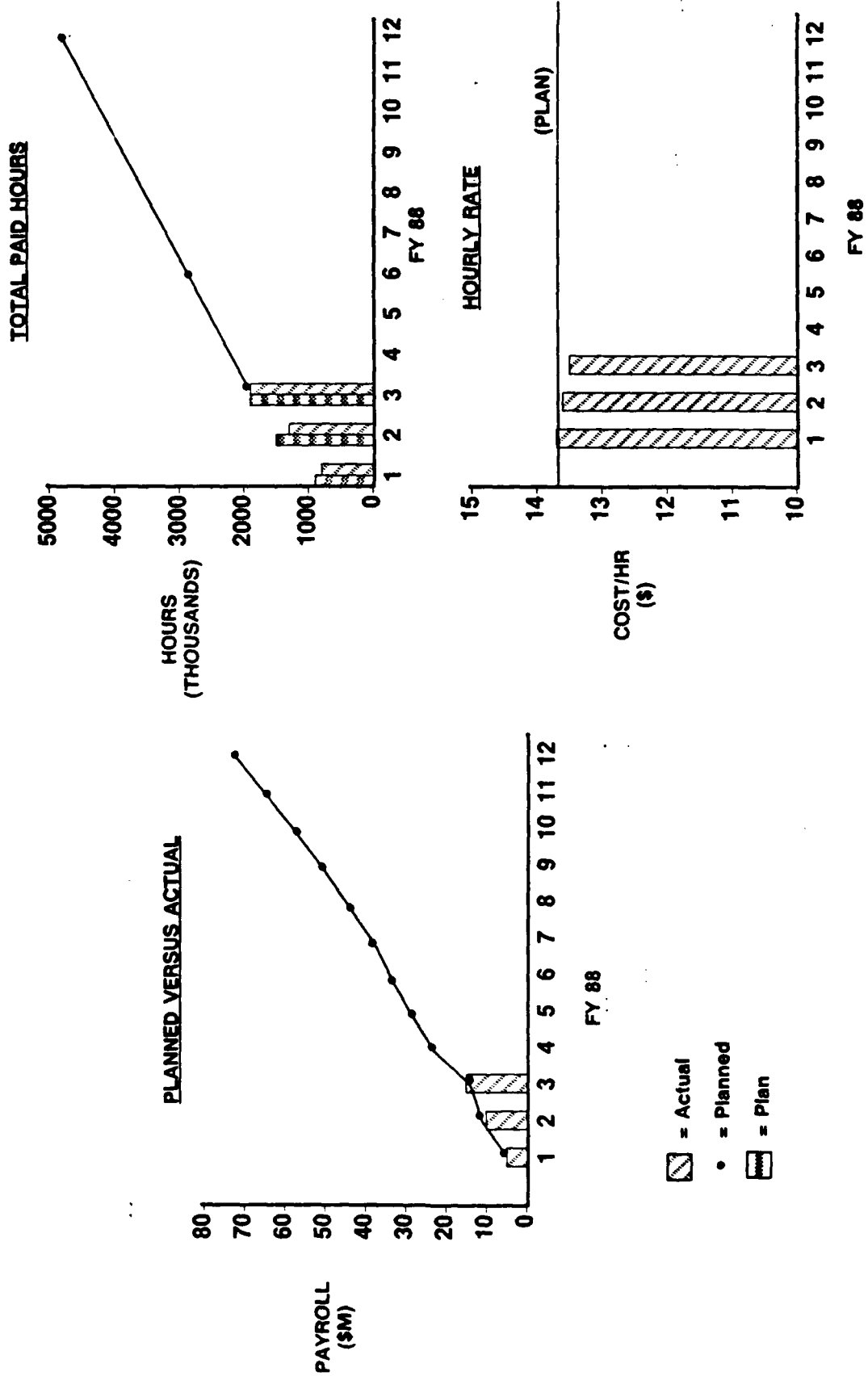
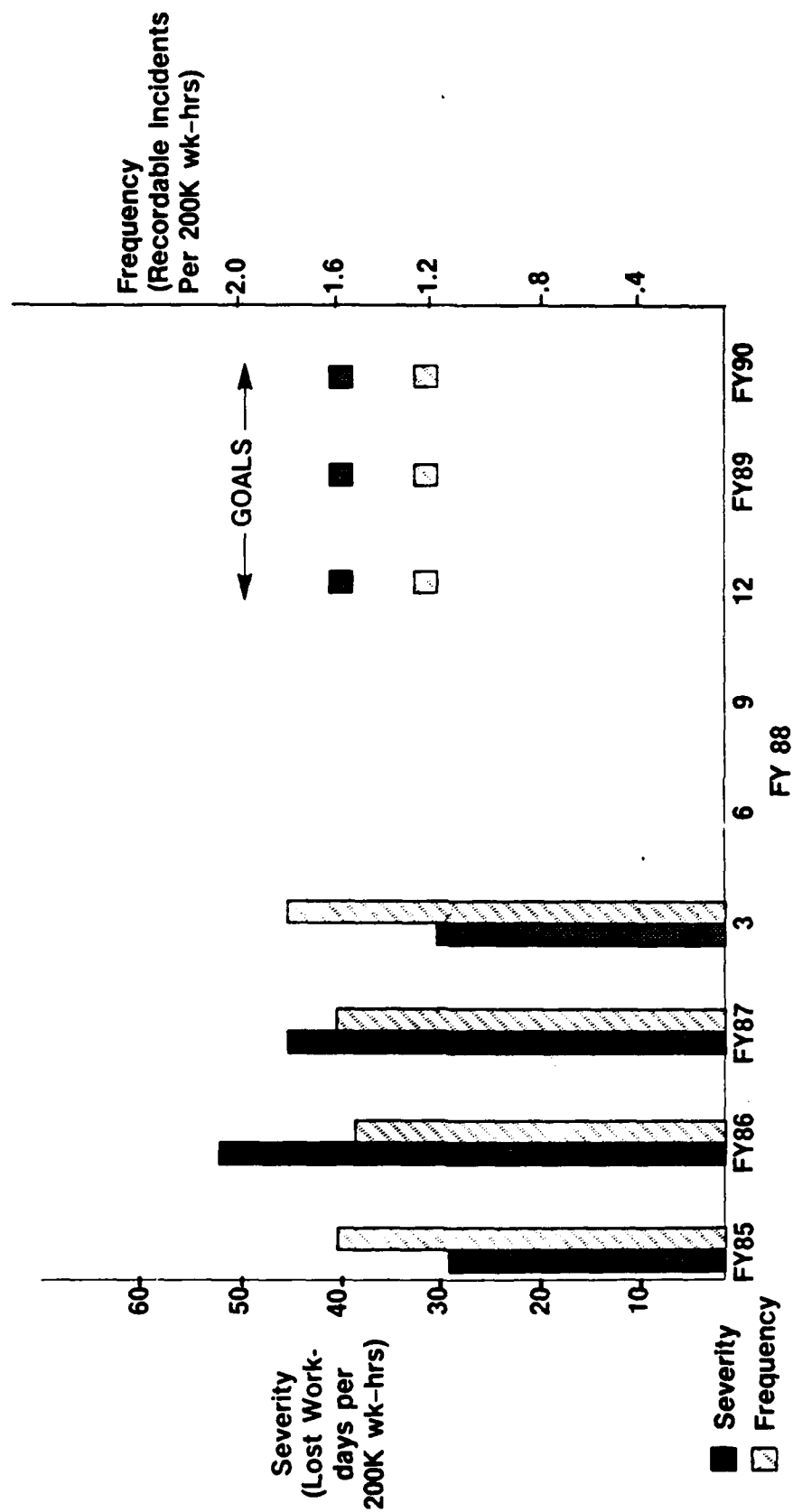
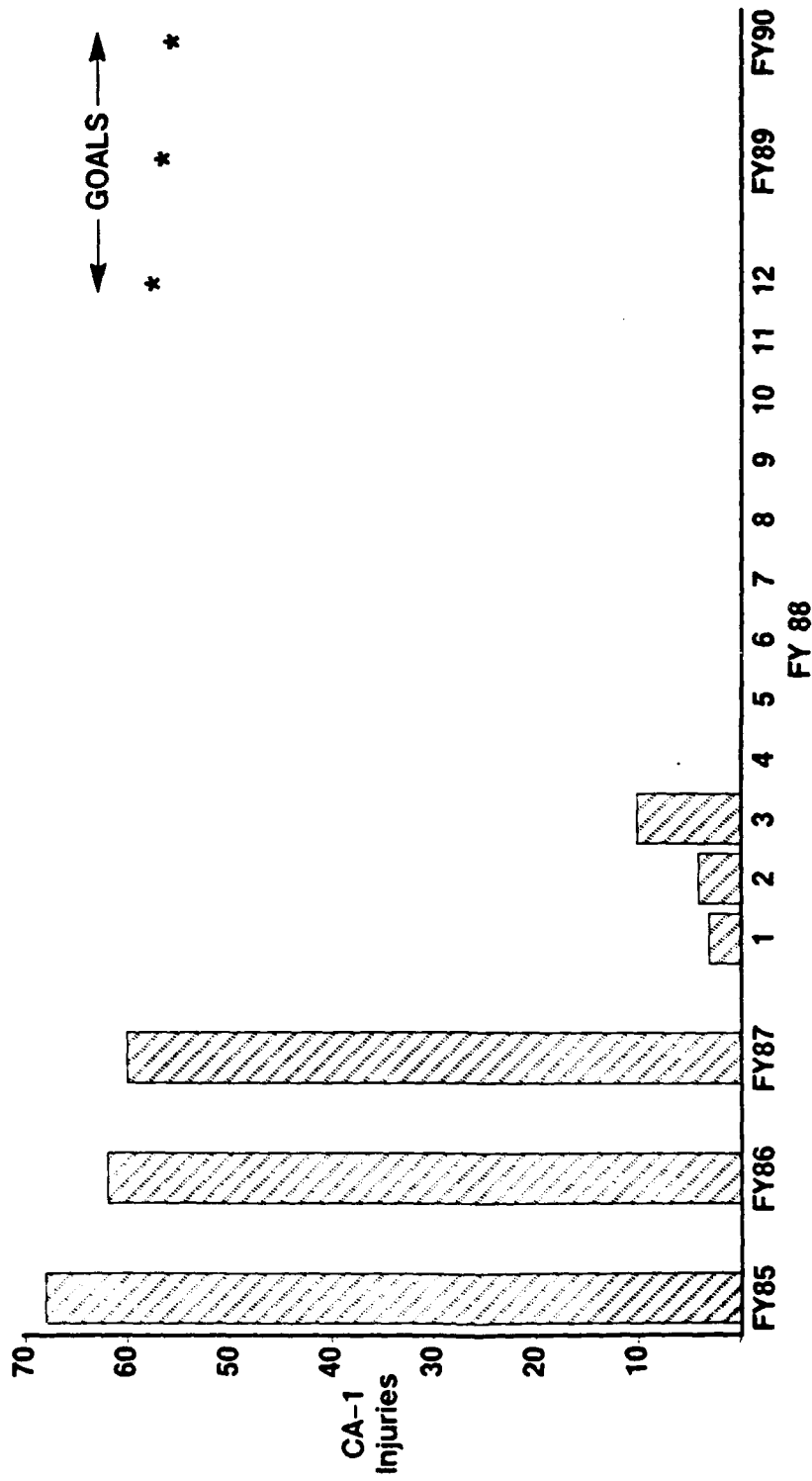


FIGURE A-9. MANAGE TO PAYROLL

Incident Rate

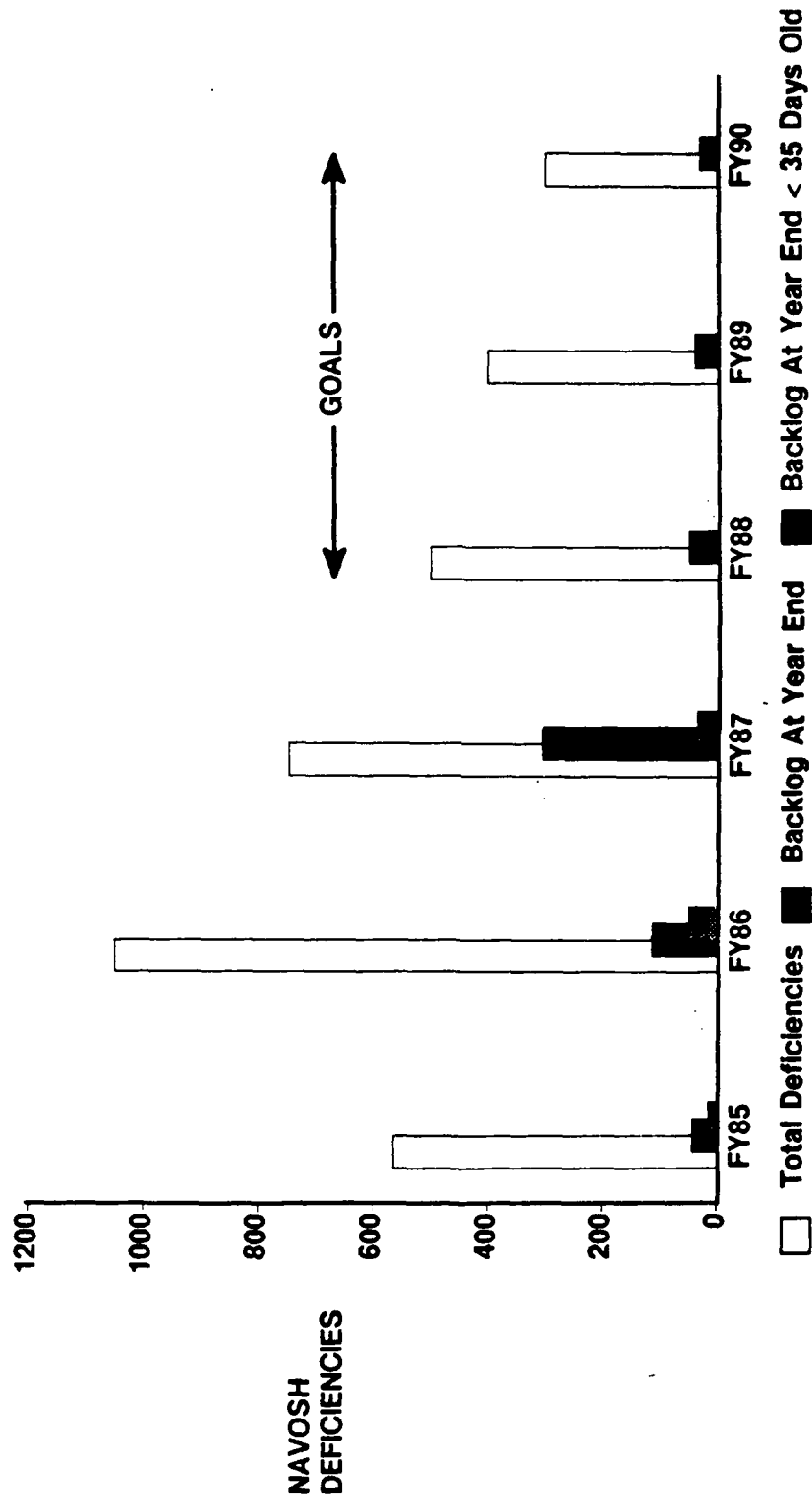
Comments: _____

FIGURE A-10. SAFETY INDICATORS

CA-1 Injuries

Comments: _____

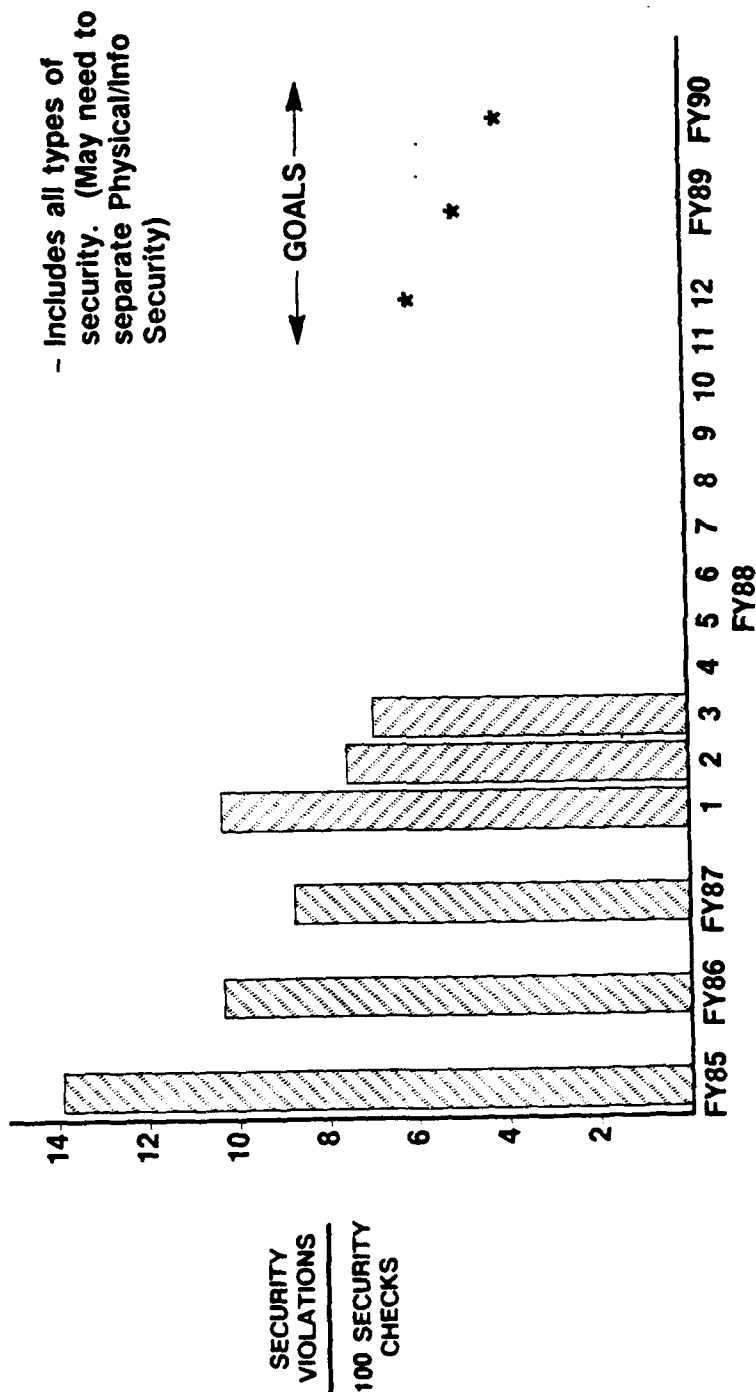
FIGURE A-11. SAFETY INDICATORS

NAVOSH DEFICIENCIES

Comments: _____

FIGURE A-12. SAFETY INDICATORS

VIOLATION RATE

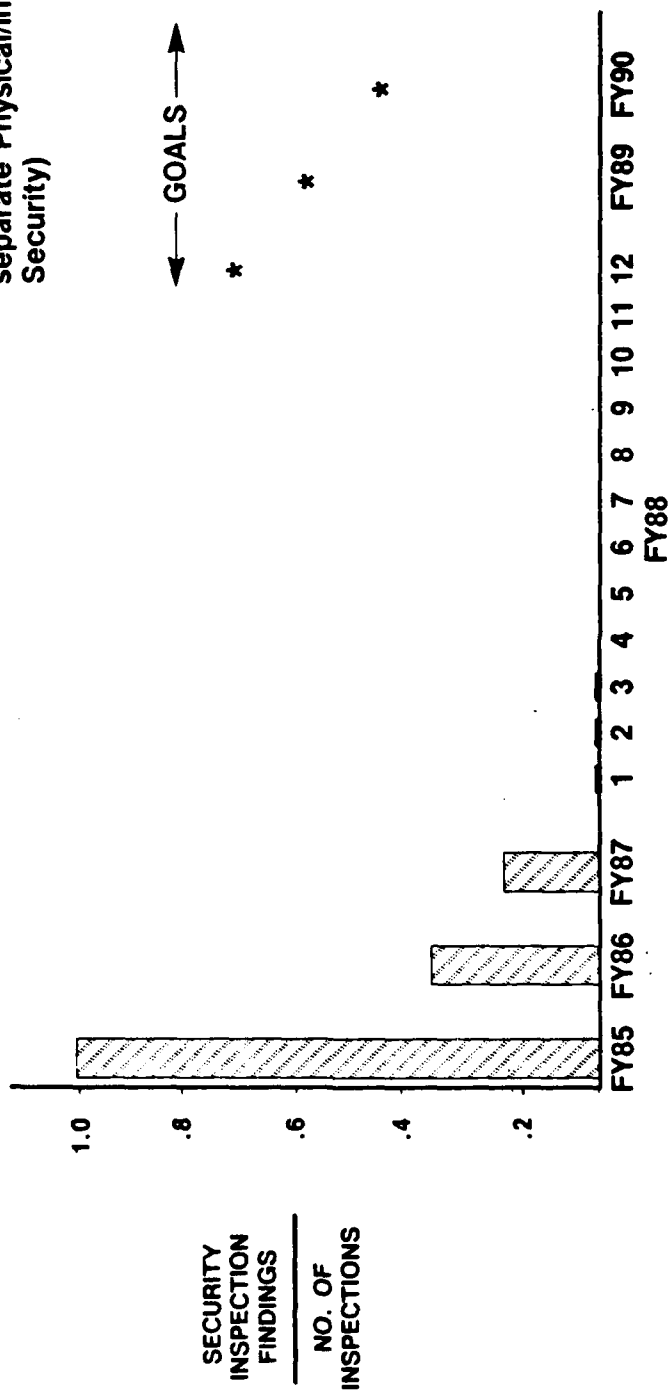


Comments: _____

FIGURE A-13. SECURITY

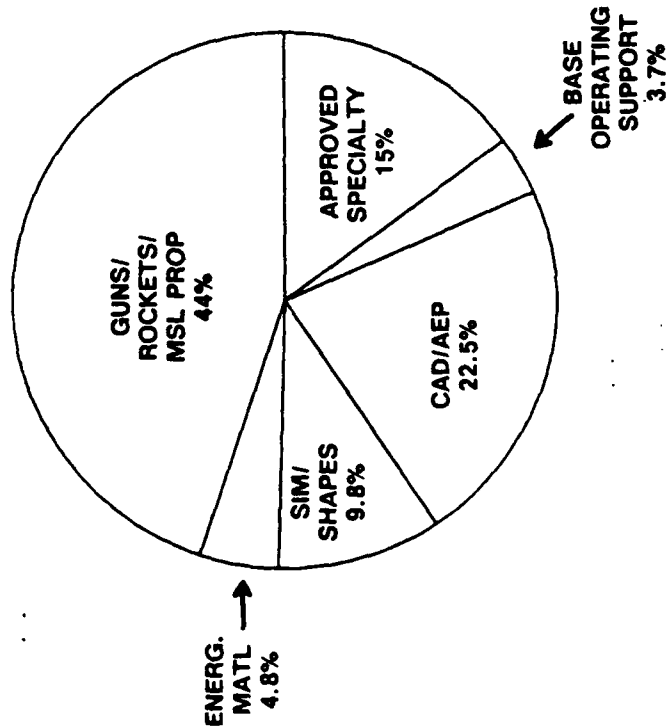
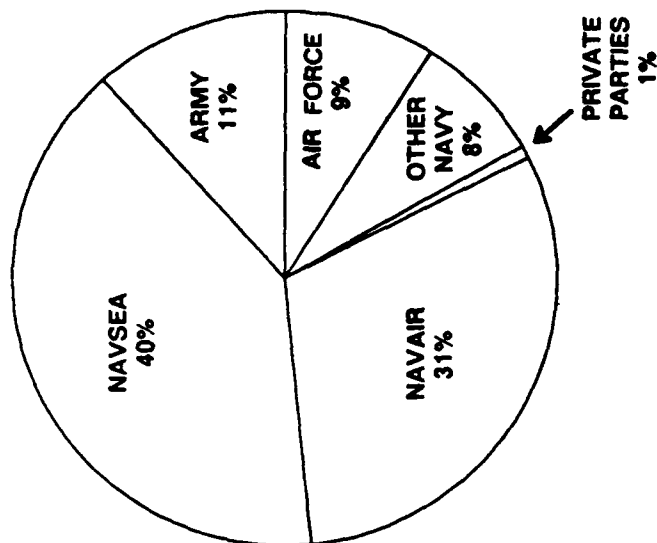
INSPECTION FINDING RATE

- Includes all types of security. (May need to separate Physical/Info Security)



Comments: No Physical Security Inspections this FY to date. Six Information Security Inspections, with no findings.

FIGURE A-14. SECURITY

NAVORDSTA-INDIAN HEADCOESPONSOR

Comments: _____

FIGURE A-15. ACTIVITY WORKYEARS BY COE/SPONSOR

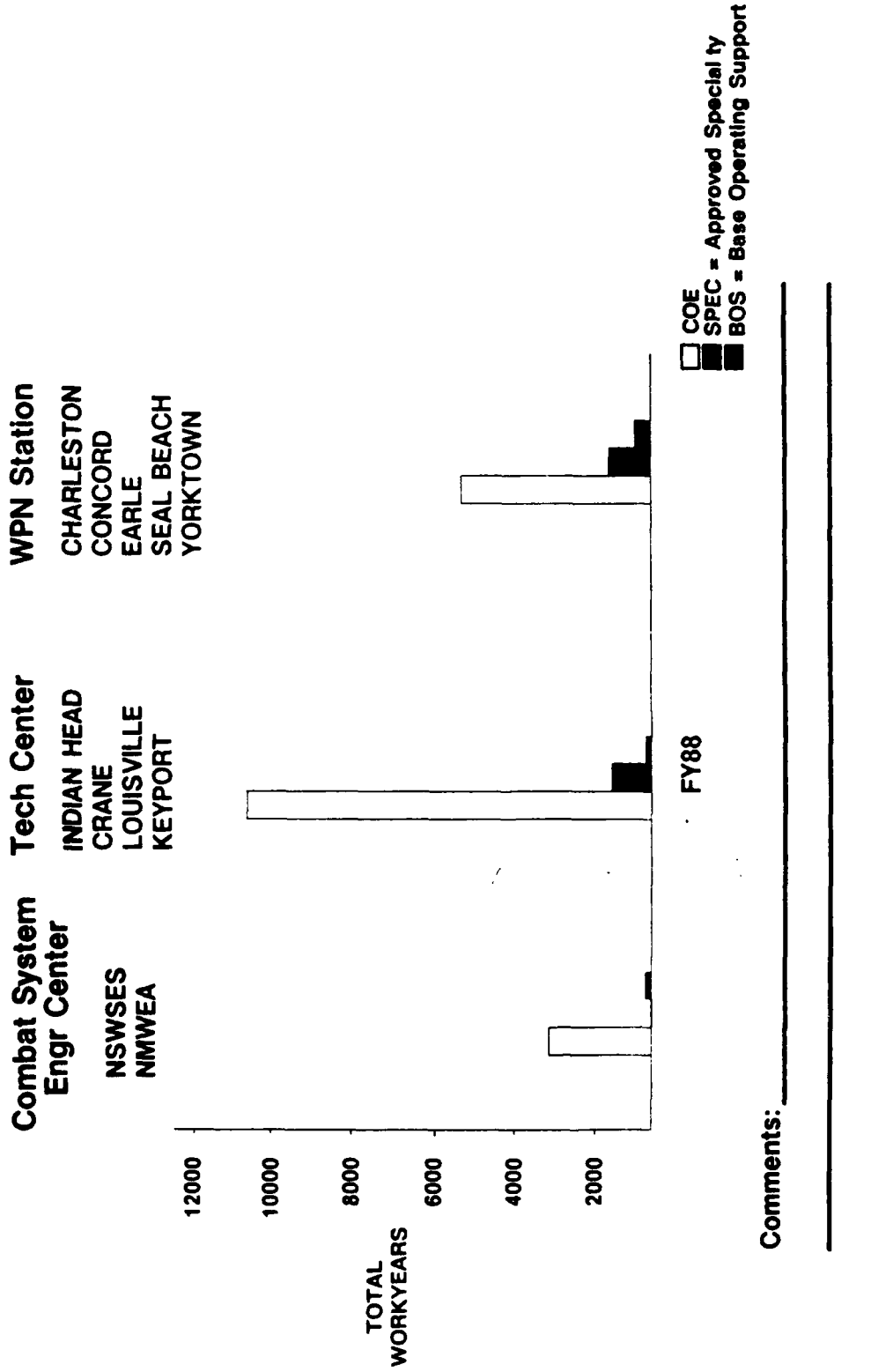
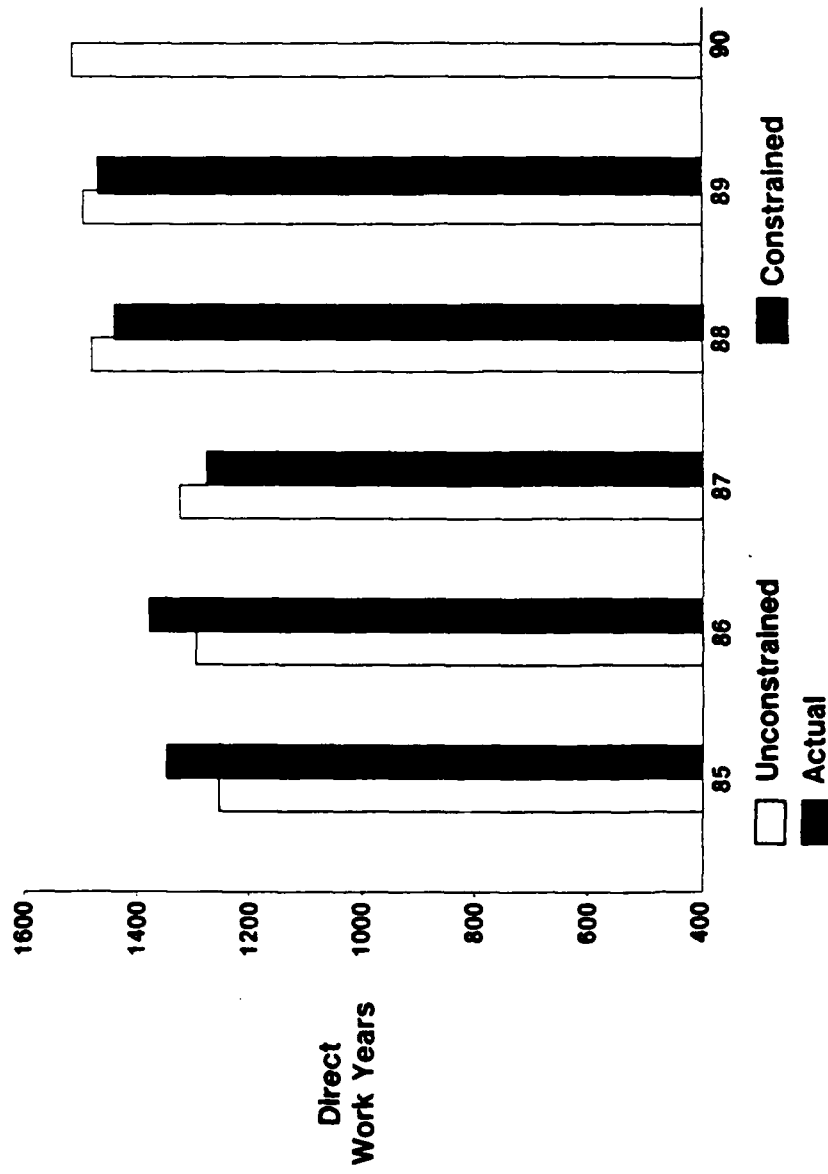


FIGURE A-16. WORKLOAD COMPOSITE BY COE



Comments: _____

FIGURE A-17. CONSTRAINED VERSUS UNCONSTRAINED WORKYEARS

NAVORDSTA - INDIAN HEAD

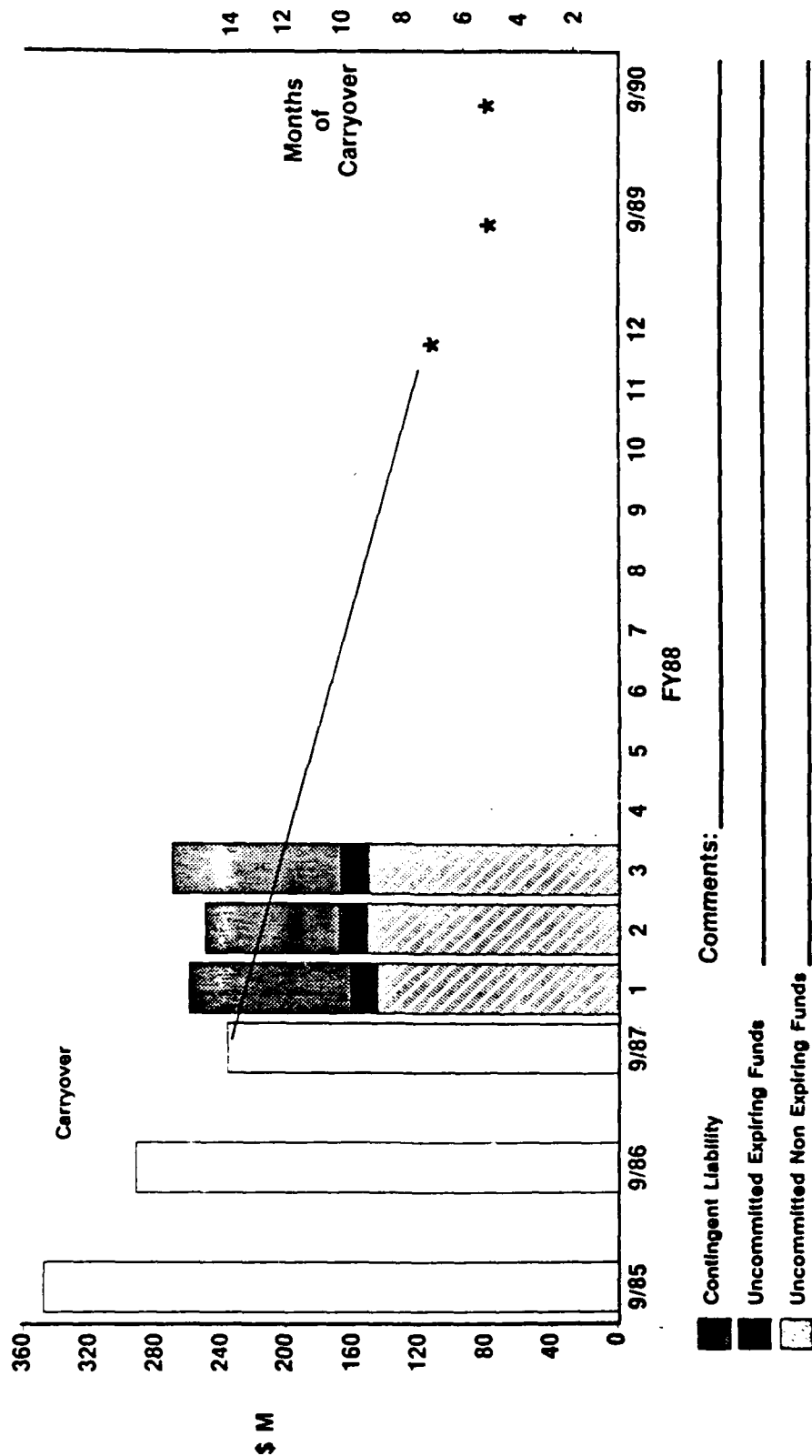


FIGURE A-18. CARRYOVER AND CARRYOVER PROJECTION
(Unexpended Balance for FY 88)

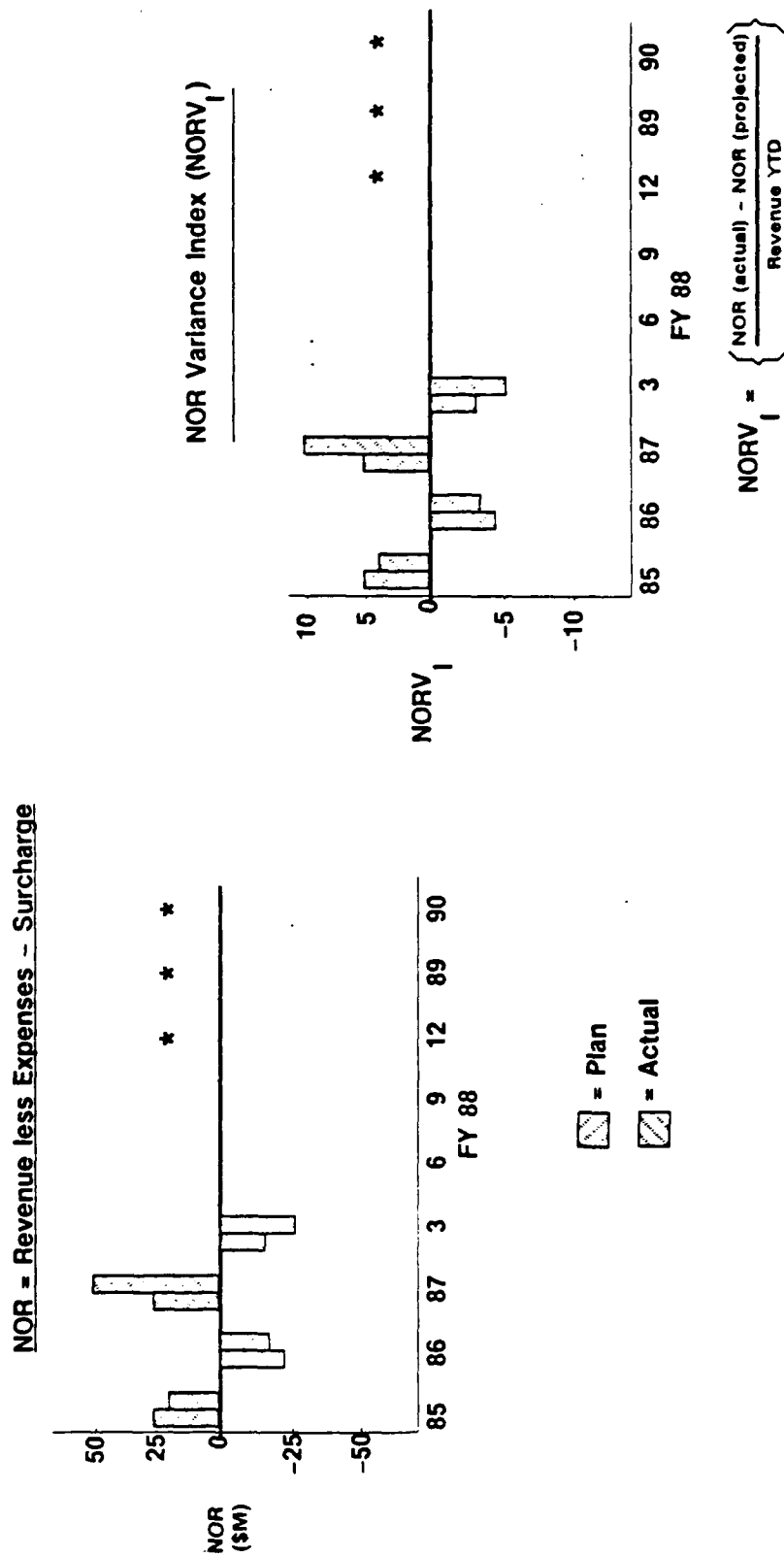
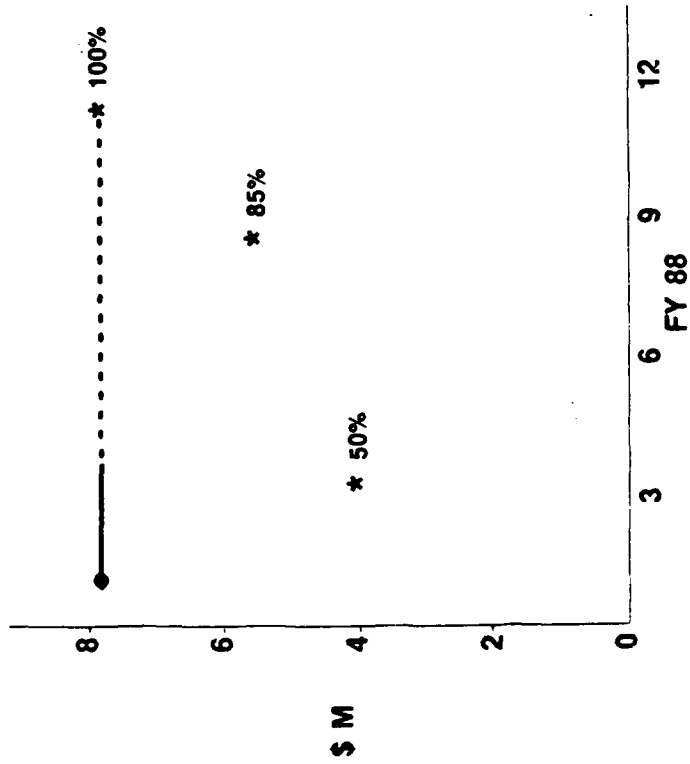
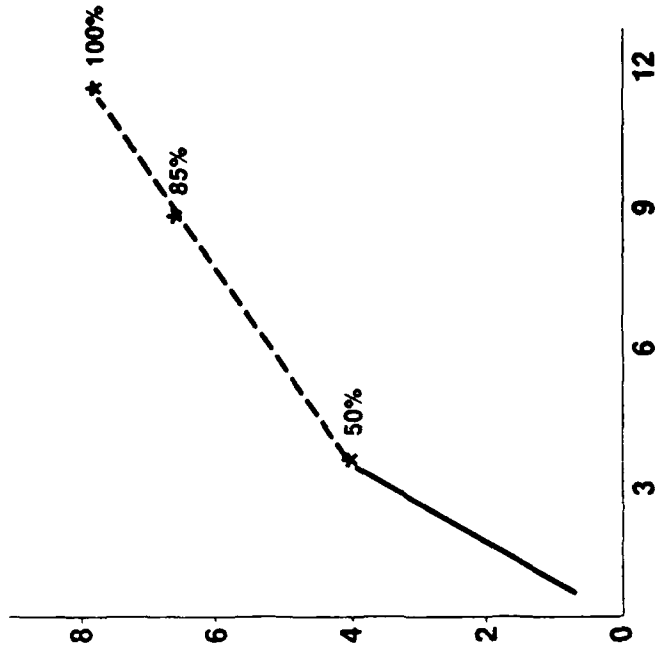


FIGURE A-19. NET OPERATING RESULTS

EQUIPMENT



OTHER



Other = Minor Construction, MIS (S/W), Alts & Mods

— = Actual - - - - - = Plan

Comments: _____

FIGURE A-20. ACP OBLIGATION RATE

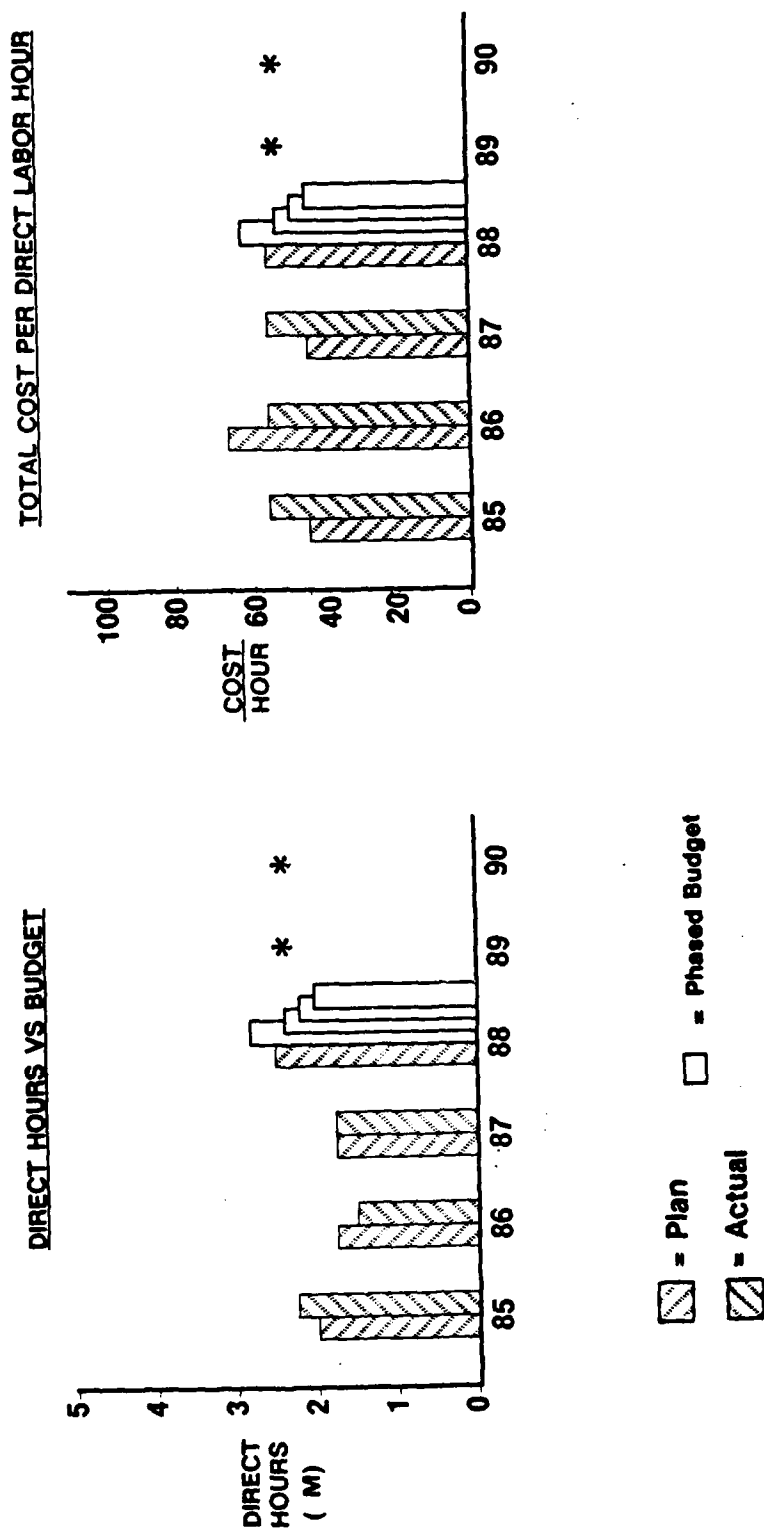


FIGURE A-21. DIRECT LABOR HOURS

NIF - MAINTENANCE AND REPAIR

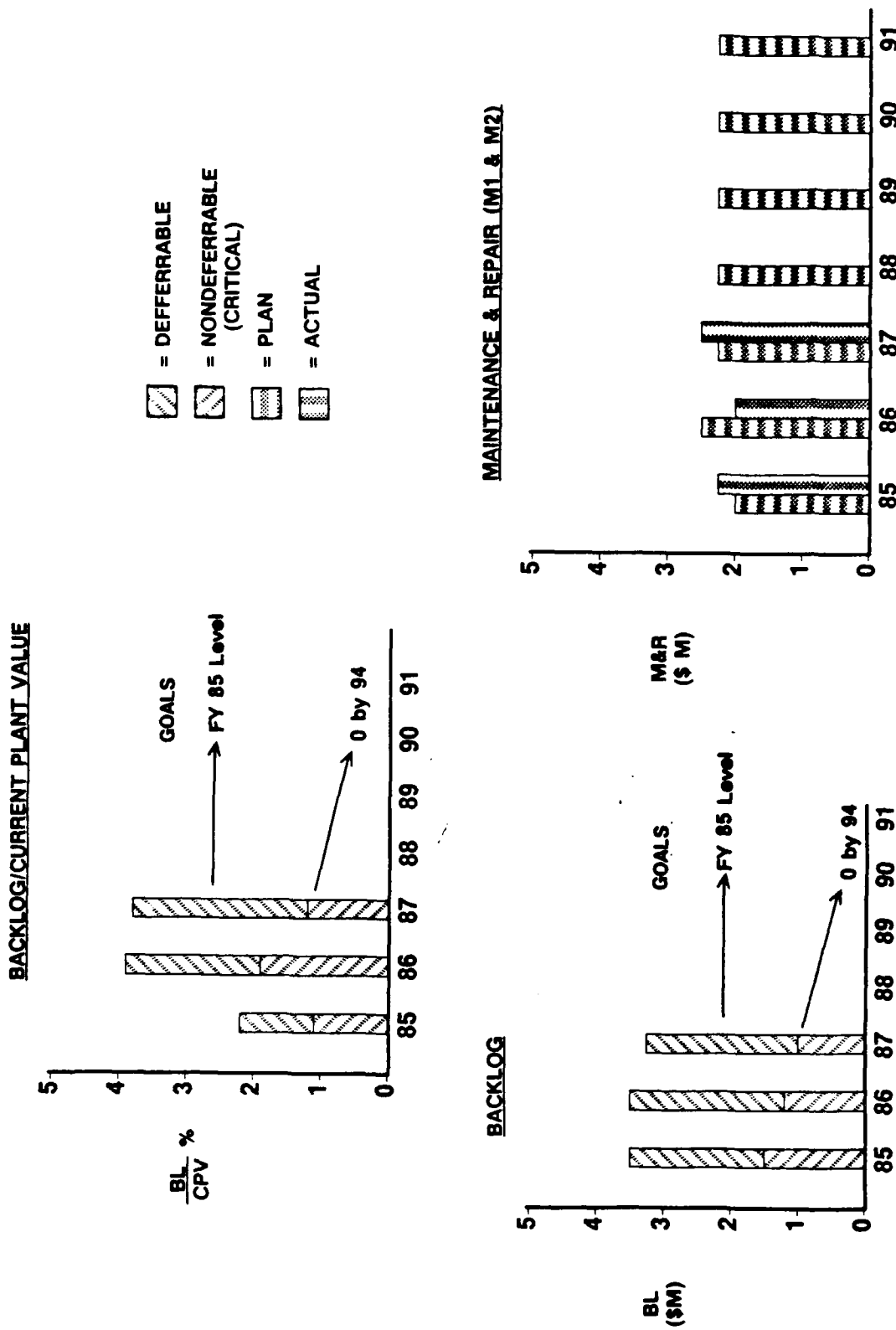


FIGURE A-22. FACILITIES

O&M,N - MAINTENANCE AND REPAIR

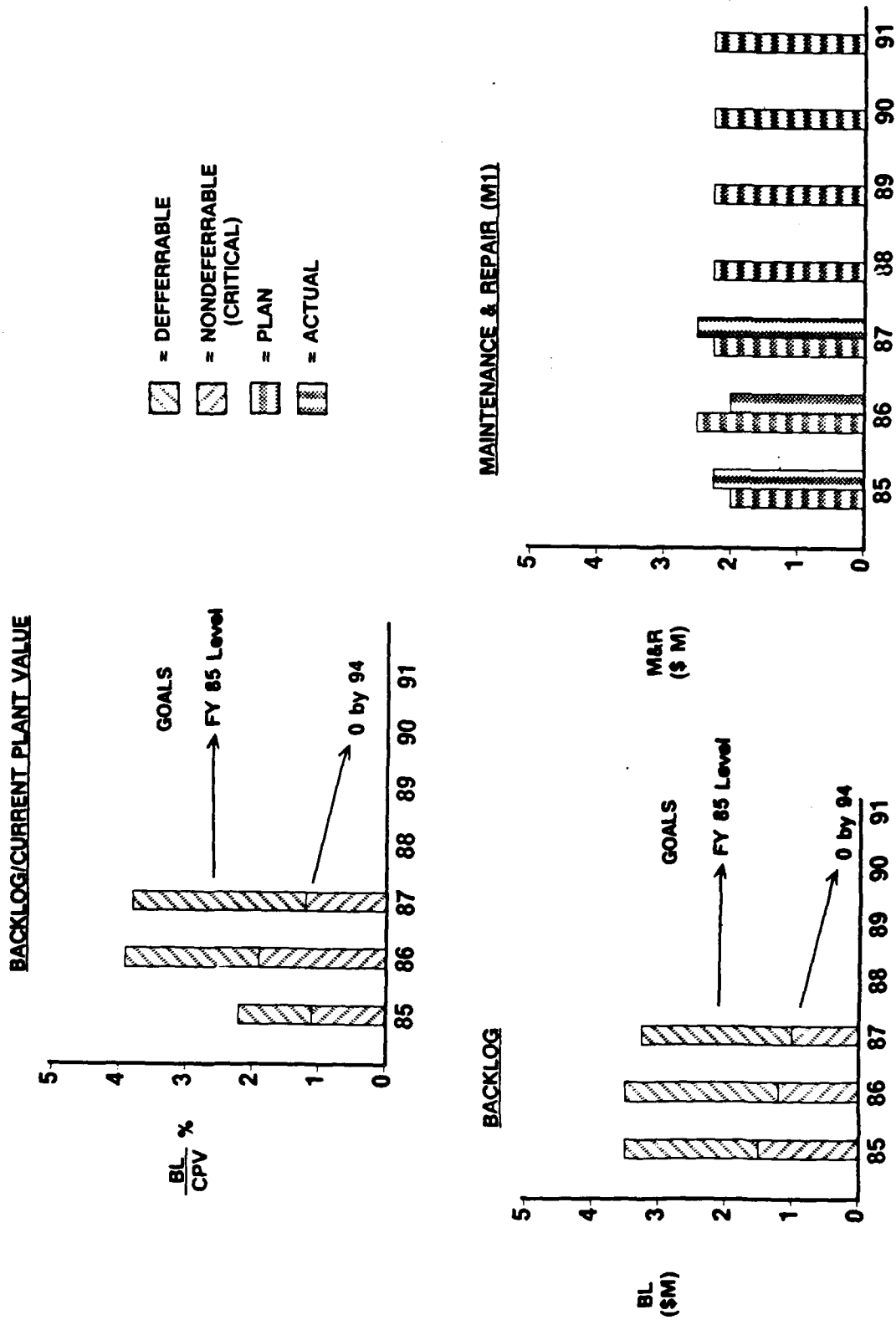


FIGURE A-23. FACILITIES

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